THE AMERICAN JOURNAL OF ROENTGENOLOGY

OFFICIAL ORGAN OF THE
AMERICAN ROENTGEN RAY SOCIETY

EDITOR

DR. P. M. HICKEY, 32 Adams Ave., W., DETROIT.

ASSOCIATE EDITORS

DR. E. W. CALDWELL - New York.
DR. R. D. CARMAN - Rochester, Minn.
DR. JAMES T. CASE - Battle Creek, Mich.
DR. A. W. GEORGE - Boston, Mass.
DR. G. E. PFAHLER - Philadelphia, Pa.
PROF. J. S. SHEARER - Ithaca, N. Y.
DR. F. C. ZAPFFE - Chicago, Ill.

VOLUME III NUMBER 5

May, 1916

PUBLISHED MONTHLY BY PAUL B. HOEBER
NEW YORK CITY

Standardize Your X-Ray Exposures

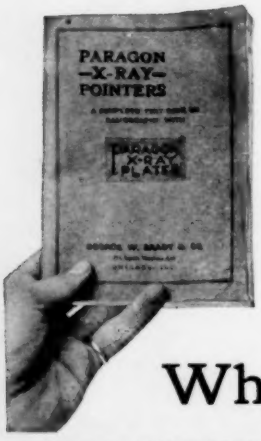
Is your X-Ray work so good that it cannot be improved?

If you knew of a book which would help you to improve your work 100%, would you buy it?

We offer you a book of this kind FREE with full details of our Milliampere Second Exposure Technique, which will insure your getting an excellent radiograph every time with either Coolidge, Hydrogen, or Common type X-Ray tubes, and with any make of apparatus.

Can you afford to do X-Ray work along the old lines when you can have the latest technique gratis, for the asking?

Send for this Free Book



This book has brought forth more words of appreciation and commendation, perhaps, than any similar book ever published. It is complete, concise, handy. A veritable fountain of information. Easier to use than the large books.

Size 5¼ x 7¼; 64 pages. Indexed. Substantially bound.

Send for your copy, today, mentioning the type of apparatus you have. If you do it now, you can't forget, and you won't regret.

Why Paragon Plates Lead

Paragon X-Ray Plates promptly took the leading position in the field because of their speed, uniformity, delicate shadings and strong contrasts. They are made in America, assuring freshness and dependability. They are carried in stock in Boston, New York, Philadelphia, Rochester, Cincinnati, Chicago, St. Louis, Minneapolis and San Francisco, assuring prompt filling of orders.

The provisions of the Workmen's Compensation Acts, now passed or pending in many states, require X-Ray plates of all fracture cases. These should bear the surgeon's name.

Our plate marker is a "little daisy," and we include one, free, with an order for a dozen Paragon plates. Take advantage of this opportunity to supply yourself with all you need.

PARAGON X-RAY PLATES

GEO. W. BRADY & CO.

761 S. WESTERN AVE. CHICAGO

THE AMERICAN JOURNAL OF ROENTGENOLOGY

Editor, P. M. Hickey, M. D., Detroit

VOL. III (NEW SERIES) MAY, 1916 No. 5

SOME OBSERVATIONS UPON THE RESPIRATORY MOVEMENTS OF THE HEART AND DIAPHRAGM*

A PRELIMINARY REPORT

BY GEORGE W. HOLMES, M.D., BOSTON, MASS.

DURING the past two years we have been making studies of the heart, great vessels and diaphragm by the combined use of the fluoroscopic screen and teleroentgenograms.

In the study of the heart by means of the roentgen ray, three methods of examination are available, all of which have been carefully studied by others. Their advantages, disadvantages and margins of error have been discussed by Albers-Schönberg and Groedel.

There is first, the orthodiagraph of Moritz, second, teleroentgenography introduced by Köhler, and third, fluoroscopy.

In a complete roentgen examination of the heart, great vessels and diaphragm, it should be possible to make and record observations as to variation in size, shape, position, and pulsation; also the movements with respiration, and with change of position of the patient. All of this data can not be obtained from a single plate. It is necessary also to limit, as far as possible, errors due to the limitation of the observer, and to keep the cost of examination within practicable limits.

With these objects in view, we adopted the following technique, after spending considerable time trying the various methods described in a rather extensive literature upon this subject.

The plate and screen methods are combined, thereby obtaining all possible data. The screen observations are made with the patient prone, upright, and in the lateral position successively, with the tube at a distance of two feet behind the patient. In these positions tracings are made of the outline of the great vessels, heart and diaphragm during normal breathing, forced inspiration and forced expiration. As no attempt is made at this time to obtain accurate data as to size, it is not necessary to use parallel rays, and the entire field can be illuminated at once. With a fair amount of training, the observations as to shape, position, pulsation and movements can be quickly recorded. Then with the patient in the upright position, a plate is taken with

*From the Roentgen Department of the Massachusetts General Hospital.

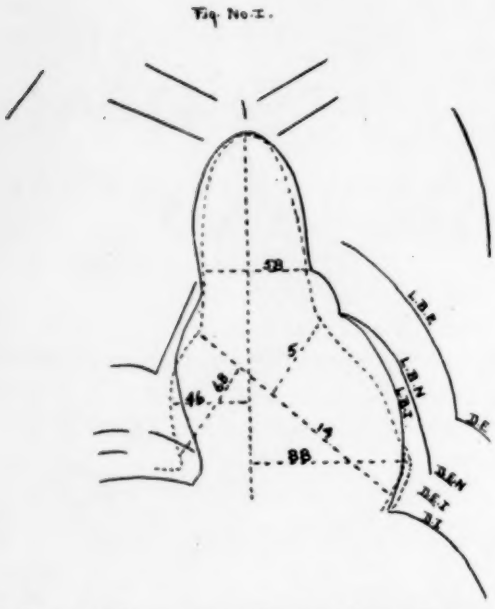


FIG. 1. TRACING OF A NORMAL HEART, SHOWING THE AMOUNT OF EXCURSION OF THE LEFT BORDER OF HEART AND OF THE DIAPHRAGM, WITH FORCED BREATHING.

The dotted lines represent the actual size of the heart as determined from a plate taken with the tube at a distance of 6 ft.

The line marked L.B.I. is the left border of the heart during full inspiration. L.B.N. is the left border during normal breathing and L.B.E. is the left border during full expiration.

D.E.N. and D.E.I. show the position of the diaphragm during normal breathing. D.E. and D.I. its position during forced breathing.

the tube at a distance of six feet. This plate need not be over 10 x 12 size, and any good paper may be used instead of the usual photographic plate. From this, the actual size of the heart is determined by taking the measurements adopted by Groedel.

For determination of size and shape of the heart, it is of great importance that the plate or screen be placed flat against the patient's chest, and that the course of the parallel rays from the tube be at right angles to the transverse diameter of the chest, because a slight rotation of the patient's body will diminish the size and change the shape of the heart shadow. To avoid this, it is desirable when making the exposure of the plate to use some apparatus which will hold the patient in the proper position. It is important also that the center of the tube be opposite the center of the heart shadow. This level can be approximated by using the 6th thoracic vertebra as a landmark, but as there is considerable variation in the relation of the heart to this vertebra, it is better to place a mark on the skin over the center of the heart shadow at the time the screen observation is made and to set the tube at the same level.

The upright position is preferred for obtaining the plate from which the heart size is to be determined, because it is more convenient, because more of the heart shadow is seen above the diaphragm in this position, and because this is the position in which the heart is most often examined clinically, and, therefore, best suited for comparison with the results of such examination.

It is not desirable or necessary to ask the patient to stop breathing during the exposure. There is very little movement of the heart shadow during normal breathing, but in deep inspiration or expiration it changes much both in size and shape. Very few patients will stop breathing without taking a deep breath and should it become desirable to repeat the examination for purposes of

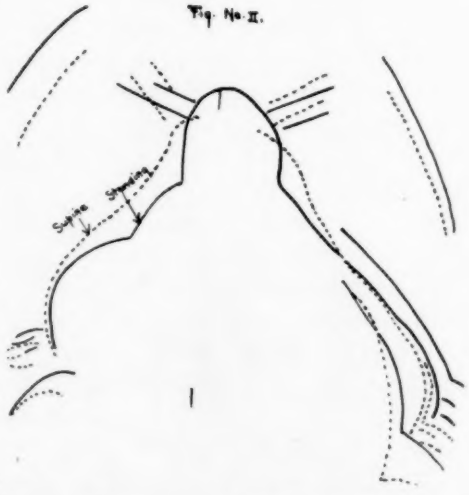


FIG. 2. TRACING FROM A CASE OF PERICARDIAL EFFUSION.

The solid lines represent the shape of the heart shadow in the standing position. The dotted line shows the change of shape with the patient in the supine position.

Note the well-marked excursion of the left border with forced breathing.

comparison, it would be difficult to get the same degree of inspiration.

It is not advantageous to use very short exposures. With an exposure of two or three seconds the image obtained will represent the greatest area of the heart shadow during this period which will represent the phase of diastole. Instantaneous exposure will show the heart sometimes in systole and sometimes in diastole, but the latter phase is required when measurements are to be taken for purposes of comparison. The phase of diastole is required also for comparative study of outline, the importance of which has been emphasized, recently, by Wisner, of New York.

It is especially desired to call attention in this paper to the excursion of the left border of the heart in adhesive pericarditis and the position and excursion of the diaphragm in visceral ptosis. Although the material in hand at present is not sufficiently large to form a basis for definite conclusions, the findings, we think, are of value.

Normally, there is a fairly definite relation between the excursion of the left border of the heart and that of the diaphragm with forced respiration, as may be seen by reference to the accompanying tracings of different types of normal chests. The relations vary somewhat in different types of chests, and may be influenced by disease other than pericarditis.

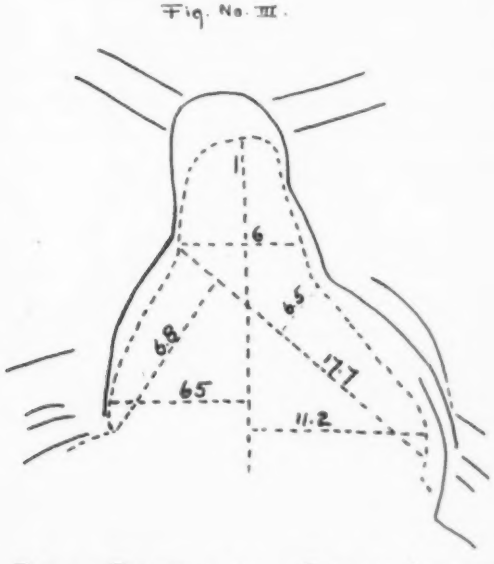


FIG. 3. TRACING FROM A CASE OF ADHESIVE PERICARDITIS.

The dotted line shows the size of the heart.
Note the limited respiratory excursion of the left border of the heart as compared with that of the diaphragm. Compare this figure with FIG. 1.

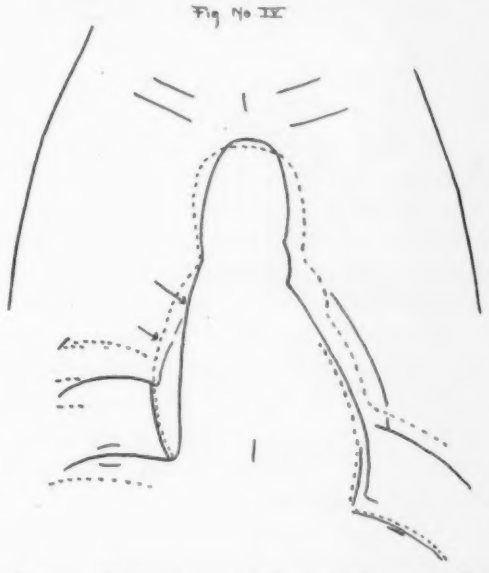


FIG. 4. TRACING FROM A CASE OF EXTREME VISCERAL PTOSIS.

The solid lines show the position of the heart and diaphragm during normal and forced breathing with the patient in the upright position. The dotted lines show the change taking place when the examination is made in the supine position.
Note the absence of the downward excursion of the diaphragm with forced inspiration in the upright position.

With the heart adherent to the pericardium, its movements within the chest are limited. We should, therefore, expect that the lift of the diaphragm would not displace this heart in the same way or to the same extent that it does the normal. Fig. 3 is a tracing from a case of adherent pericarditis, proven at autopsy. It shows very plainly a decrease in the excursion of the left border of the heart as compared with that of the diaphragm.

So far the findings have been fairly constant. In cases where there is involvement of the pleura or extensive mediastinitis, however, this sign would be of little use. It has been difficult to check up the observations owing to the impossibility of obtaining

positive diagnoses in such cases except by autopsy.

To determine the amount of movement of the heart with respiration, it is necessary to trace its border as well as that of the diaphragm in forced inspiration, forced expiration and during normal breathing.

In studying a series of tracings made in this way it was noted that there was a marked limitation in the downward excursion of the diaphragm in the so-called ptotic type, when the patient was standing, but that this limitation disappeared when the patient was prone. Fig. 4 shows the position and excursion of the diaphragm in a patient with visceral ptosis.

In the upright position the diaphragm of the ptotic hangs nearer its lowest level than it does in the normal, and he is unable to take a deep breath without first exhaling. In examining this class of patients for disease of the respiratory organs this fact should be considered. It may be of importance also in the treatment of ptosis. These patients should breathe with less effort when lying down. Any method of support, whether surgical or medical, is not likely to prove satisfactory unless it holds the diaphragm up.

The low position of the diaphragm removes part of the support of the heart and, to some extent, affects its action.

SOME STATISTICS ON THE NEGATIVE AND POSITIVE ROENTGEN DIAGNOSIS OF GALLSTONES*

BY JAMES T. CASE, M.D., F.A.C.S., BATTLE CREEK, MICH.

NO one likes to be wrong, and yet every roentgenologist of experience has frequently to acknowledge his error, making meanwhile a mental resolution not to be caught again, at least not on that particular point. For the purposes of this discussion, I have some statistical data to offer. Last September I promised an early publication of some statistics on my gall-bladder work. Naturally I have not been able to follow up all the cases. Up to the first of October, 1915, I had demonstrated gallstones roentgenologically in 225 cases. Many of these have been verified surgically at the Battle Creek Sanitarium. Others have been operated at other institutions or by their home surgeons. Still others have rejected operation, although, on account of the possibility of complications arising from retained gallstones, even though at the time they appear to be symptomless, we have, in practically every instance, recommended surgical intervention.

Errors in Positive Diagnosis.—Up to the present moment I am aware of four cases in which I have erroneously made a positive diagnosis of gallstones. I have probably erred in a few other cases, but if so I have not been apprised of it. The following tabulation gives the details of the four cases:

TABLE I

CASE I.—*X-ray Report:* In the region of the gall bladder a number of small, irregular shadows, very faint, but seen on repeated examination. Marked tenderness over the gall-bladder region. Duodenal bulb deformed on the gall-bladder side, as by adhesions. Cholelithiasis.

Operative Findings: Extensive adhesions between the gall bladder and the gastrohepatic omentum, but no gallstones found.

CASE II.—*X-ray Report:* Cholelithiasis, at least two large gallstones. Gall-bladder adhesions. Adherent, tender, poorly drained appendix.

*Contribution to a Discussion on Gallstones, at a Meeting of Roentgenologists, January 30, 1916 Atlantic City, N. J.

Operative Findings: Thick-walled, distended gall bladder filled with thick black bile. No trace of stones in the gall bladder or ducts. Appendix thickened and filled with fecal matter.

CASE III.—*X-ray Report:* Constant suspicious shadow occupying the gall-bladder region. I believe it is a gallstone.

Operative Findings: Gall bladder examined, found to be normal. No stones could be palpated.

CASE IV.—*X-ray Report:* Cholelithiasis, several large faceted shadows being recognized in the gall-bladder region. Shadows confirmed at later examination.

Operative Findings: No gallstones palpated. The appendix, which was large and rounded, especially at the tip, was adherent to the outer, posterior surface of the cecum for its entire length. The cecum was inverted so that the appendix lay in contact with and adherent to the gall bladder. Gall-bladder walls thickened and so evidently diseased that a cholecystectomy was performed.

In Case I, subsequent study showed conclusively that the suspicious shadow was a calcareous deposit in the costal margin. In Case II, the shadows were so definite that were I to encounter them again in a given case, I would unhesitatingly make a diagnosis of gallstones. I was not present at the operation in this case and hence do not feel that I am able to criticize the surgeon, but it is barely possible for the surgeon at operation to fail to palpate gallstones. Dodd has reported a case from the Massachusetts General Hospital where both the surgeon at operation and the pathologist at post mortem failed to palpate the stones which were later discovered in the distended gall bladder. In Case III, the suspicious shadow was still there after the operation, and we are still unable to explain it. It certainly was not in the gall bladder, and the patient has not submitted to further operation. The idea of a pancreatic stone was considered, but this could not be verified at the time of the operation. In Case IV, the shadows were very definite on repeated examinations. The error in this diagnosis certainly emphasizes the value of a recent paper by Caldwell on "The Safe Interpretation of Roentgenograms of the Gall-Bladder Region," and a careful study of this paper of Caldwell's should be earnestly recommended.

Percentage of Positive and Negative Gall-bladder Findings in Operated Cases.—Several years ago Dr. J. H. Kellogg, chief of the surgical staff, made it a rule in the Surgical Department of the Battle Creek Sanitarium that all patients for whom a laparotomy is proposed shall be given a barium meal examination. It is also our custom to examine the gall bladder either by palpation and inspection or by palpation alone during the course of every laparotomy, if it is at all possible. The writer has taken advantage of this fact to make a statistical study of the last three hundred cases operated by Drs. Kellogg, Harris and myself in the surgical wards of the Battle Creek Sanitarium, in which the surgical records show that the gall bladder was examined at the time of operation. The following tabulation is based on this series of 300 operated cases:

TABLE II

Total number operated cases in this series	300
Gallstones found at operation	41
Of these:	
Roentgen report "positive"	20
Roentgen report "suspicious"	8
Roentgen report "negative"	13
Percentage of positive diagnosis	49
Percentage of positive or suspicious	68
Percentage of failure to diagnose	32
Percentage of failure to make definitely positive diagnosis	51
Positive roentgen diagnosis of gallstones	21
Of these:	
Positive at operation	20
Negative at operation	1
Percentage positive at operation	95
Percentage negative at operation	5

Roentgen findings negative for gallstones	257
Of these:	
Negative at operation	244
Stones found at operation	13
Percentage stones found at operation in spite of negative *x*-ray findings	5
Roentgen report "suspicious of gallstones"	22
Of these:	
Stones found at operation	8
No stones found at operation	14

It will be noted in the above tabulation that in one case gallstones were reported positive in the roentgen examination, but were not found at operation. This was the last of the four cases reported in Table I.

The Negative Roentgen Diagnosis of Gallstones.—In 257 cases the *x*-ray report was "negative for gallstones." Operation revealed thirteen cases of cholelithiasis in this series. Hence the percentage of correct negative diagnosis was ninety-five! Such a figure is comparatively worthless, however, for in probably 200 of these cases the patients had no symptoms of gallstones, and I have referred to it simply to show the absurdity of such a percentage.

You will probably be more interested in the details as to the *x*-ray and operative findings in the twenty-two cases reported "suspicious" and in the thirteen cases where the roentgen report was "negative," but where stones were found at operation. Some have criticized our practice of reporting "suspicious shadows," unless we can make a definite statement that they are due to biliary calculi. I am strongly of the opinion that these suspicious shadows should be reported, for, if note is made of them, the surgeon will be more likely to exercise special care in palpating the gall bladder at operation. If, as in Dodd's case reported above, it is possible for the surgeon at operation and the pathologist at post mortem to fail to palpate stones in the gall bladder, the roentgenologist should not be judged too harshly if, at operation, the surgeon fails to confirm the diagnosis of gallstones. Of course, no operation should be done on the strength of roentgen findings which are only suspicious unless clinical findings would seem to confirm the suspicion.

The following is a tabulation of the twenty-two cases in which a report "suspicious of gallstones" was made. In fourteen the operative findings were negative for stone. In three of these fourteen cases the gall bladder was so badly diseased as to warrant cholecystectomy. In six cases there were extensive adhesions about the gall bladder. There was one case of carcinoma of the liver, pancreas and gall bladder, and one case of syphilitic disease of the liver in which the gall bladder was buried in adhesions and probably contained gallstones. In only three cases was the gall bladder found normal.

TABLE III

Case I.—Examination January 20, 1913, by Dr. Percy Brown: The gall bladder presents a faint nebulous mass which could be produced by a single large gallstone of low specific gravity. My report, February 18, 1915: On several occasions a large ovoid shadow was seen in the gall-bladder region, suggestive of gallstones, but not sufficiently clear for a definite diagnosis of cholelithiasis. Annular pyloric stenosis.

Operative Findings: Annular pyloric stenosis, necessitating gastroenterostomy. General thickening of the gastric wall, especially at the pylorus. No other evidence of malignancy. Two rounded gallstones, each about half an inch in diameter. These stones were of a reddish color, rough and rounded.

Case II.—*X-ray Report:* A very large suspicious shadow in the gall-bladder region, ovoid in shape, the longest diameter about two and one-half inches, the shortest about an inch. Lying within the large shadow are a number of small shadows which seem to represent small calcareous particles—probably gallstones.

Operative Findings: Gall bladder as large as a hen's egg, and freely movable, thin-walled, containing fifteen large and fifty small

gallstones. Each of these stones had a small calcareous nucleus.

CASE III.—*X-ray Report:* Faint shadows opposite the second lumbar vertebra, about two inches from the mid-line, independent of the kidney shadow, confirmed on repeated examination, very suggestive of gallstones. Emptying time of the stomach nine hours.

Operative Findings: Gall bladder thick-walled, distended, buried in adhesions, containing one large and several small gallstones, one obstructing the cystic duct.

CASE IV.—*X-ray Report:* Gastric stasis beyond twelve hours. Faint shadows in the gall-bladder region, very suggestive of gallstones.

Operative Findings: Gall bladder thickened, adherent and completely filled with small gallstones.

CASE V.—*X-ray Report:* Suspicious shadows seen in the gall-bladder region, associated with definite tenderness.

Operative Findings: A single gallstone the size of a pigeon's egg. Gall bladder thick-walled, otherwise normal.

CASE VI.—*X-ray Report:* A large collection of irregular shadows in the right upper quadrant, corresponding to the position of the gall bladder. Emptying time of the stomach eight or nine hours.

Operative Findings: Gall bladder thick-walled, contracted, buried in adhesions, containing seventy-five gallstones.

CASE VII.—*X-ray Report:* An irregular right upper-quadrant shadow which can be thrown outside of the renal shadow on oblique roentgenography. Adhesions about the gall bladder. Probably gallstones.

Operative Findings: Gall bladder shrunken, collapsed, containing one large gallstone, friable in composition, with a similar stone the size of a pea and several smaller ones. Extensive pericystic adhesions.

CASE VIII.—*X-ray Report:* A very suspicious shadow in the gall-bladder region associated with a spastic indrawing on the greater curvature of the stomach. Gall bladder adherent, deforming the duodenal bulb. Emptying time of the stomach four and one-half hours.

Operative Findings: Gall bladder extensively adherent, containing two large gallstones.

CASE IX.—*X-ray Report:* Several suspicious shadows in the gall-bladder region coinciding with a point of marked tenderness on pressure. Emptying time of the stomach eight hours. Extensive gall-bladder adhesions deforming the duodenal bulb.

Operative Findings: Gall bladder buried in extensive adhesions, but no gallstones palpated.

CASE X.—*X-ray Report:* Several calcareous deposits in the gall-bladder region, lying well below the costal margin, moving freely on respiration.

Operative Findings: Adhesions along the whole length of the gall bladder, but no trace of gallstones in the gall bladder or ducts.

CASE XI.—*X-ray Report:* A collection of suspicious shadows in the gall-bladder region, outside the kidney shadow, lying anteriorly, close under the costal margin, probably gallstones.

Operative Findings: Gall bladder thick-walled, contracted and evidently diseased, but no gallstones found.

CASE XII.—*X-ray Report:* Several suspicious shadows, apparently faceted, in the gall-bladder region. Findings confirmed on repeated examination. Adhesions about the gall bladder suggesting a gall-bladder lesion.

Operative Findings: Gall bladder somewhat distended, opaque, adherent on the upper side to the duodenal bulb, but no gallstones palpated.

CASE XIII.—*X-ray Report:* A faint shadow in the gall-bladder region lying to the outer side of the duodenal bulb, attended by adhesions of the duodenum, apparently of gall-bladder origin, probably gallstones.

Operative Findings: Gall bladder normal, except for adhesions to the duodenal bulb. No gallstones palpated.

CASE XIV.—*X-ray Report:* A very large, suspicious shadow, apparently the calcareous shell of some gall-bladder region mass, which is likely to be a gallstone. Emptying time of the stomach normal. Definite pain-point under the right costal margin.

Operative Findings: Gall bladder normal in size and compressible, thin-walled, central portion adherent to the duodenum.

CASE XV.—*X-ray Report:* Gall-bladder adhesions involving the duodenum. Suspicious shadows having the appearance of faceted gallstones.

Operative Findings: Adhesions about the gall bladder, but no gallstones were palpated.

CASE XVI.—*X-ray Report:* Extensive adhesions in the gall-bladder region with marked hepatofixation and a large, vague, but constant, shadow in the gall-bladder region, all suggestive of gallstones.

Operative Findings: Small gall bladder, wrapped in adhesions, but no stones palpated.

CASE XVII.—*X-ray Report:* Several rounded shadows in the gall-bladder region, lying a little in front of the anterior border of the vertebral bodies, but outside of the kidney shadow. Multiple diverticula of the colon.

Operative Findings: Gall bladder thickened and pale. Carcinoma of the pancreas and liver. Extensive adhesions involving the liver and gall-bladder region. The surgeon could not rule out gallstones.

CASE XVIII.—*X-ray Report:* A suspicious shadow in the right upper quadrant making exploration of the gall bladder advisable at the time of laparotomy for fibroids.

Operative Findings: Gall bladder compressible, soft and not containing gallstones.

CASE XIX.—*X-ray Report:* Shadows very suspicious of gallstones, faint, it is true, but seen on numerous plates. Carcinoma of the pylorus.

Operative Findings: Carcinoma of the pylorus. Gall bladder apparently healthy. No gallstones could be palpated.

CASE XX.—*X-ray Report:* A shadow in the gall-bladder region, apparently a large gallstone, having a thin calcareous shell, strongly suspicious of cholelithiasis. Gastric delay (eight hours).

Operative Findings: Gall bladder completely buried in adhesions, probably containing gallstones. A case of syphilitic liver.

CASE XXI.—*X-ray Report:* Several suspicious shadows occupying the gall-bladder region. Duodenal bulb deformed, as by gall-bladder adhesions. Emptying time of the stomach four and one-half hours.

Operative Findings: Gall bladder empty, flat, much enlarged, thickened and opaque. Cystic duct completely obliterated by a somewhat inflammatory mass. A bunch of nodules in the hepatic duct, but they could not be made out to be gallstones.

CASE XXII.—*X-ray Report:* Emptying time of the stomach considerably prolonged. Suspicious gall-bladder region shadows, faint but constant.

Operative Findings: Gastrocolic omentum wrapped around and adherent to the gall bladder, hiding it from view. After removal the gall bladder was found to be thickened and opaque, but not containing gallstones.

From a perusal of the above case reports, it seems reasonable to conclude that in at least some instances, the suspicious shadow was the thick-walled gall bladder itself, especially in the cases of carcinoma and lues. In the first eight cases of the series where the operative findings confirmed the suspicion of gallstones, some might say we were warranted in claiming a definite diagnosis, but to be perfectly fair, I did not feel *sure* that they were gallstones, and hence I only reported them as suspicious. I was no surer in the first eight cases in this series of twenty-two "suspicious shadows" where the operation confirmed the suspicion, than I was in the remaining fourteen where the operation refuted it. In these "suspicious" cases, the results show very plainly that the *x*-ray is of value in pointing out gall-bladder disease, even though a definite diagnosis of stones can not be made.

Table II shows a negative roentgen report of gallstones in thirteen of forty-one cases where gallstones were found at operation. The following table (Table IV) presents a comparison of the *x*-ray and operative findings in these thirteen cases.

TABLE IV

CASE E.C.—*X-ray Report:* Duodenum and stomach normal, except for nine-hour emptying time. Definite tenderness in the gall-bladder region.

Operative Findings: Between two and three hundred gallstones. Pylorus and duodenum normal.

CASE L.C.—*X-ray Report:* An inconstant deformity of the duodenal bulb. Definite hepatofixation; gastric hyperperistalsis. Emp-

tying time seven hours. No gallstone shadows recognized.

Operative Findings: One stone the size of a pea in the cystic duct. Extensive pericystic adhesions.

CASE E.R.C.—*X-ray Report:* Adhesions in the gall-bladder region, deforming the duodenal bulb. No gallstone shadows were recognized.

Operative Findings: One soft gallstone the size of a hazelnut. Gall bladder buried in adhesions involving the duodenal bulb.

CASE R.C.S.—*X-ray Report:* Pyloric ulcer. No mention made of gallstones.

Operative Findings: Pyloric ulcer. Two large gallstones and a number of small ones.

CASE H.M.R.—*X-ray Report:* Duodenal ulcer. No mention made of gallstones.

Operative Findings: Duodenal ulcer. Several small gallstones, the largest two millimeters in diameter, evidently cholesterin stones.

CASE L.P.—*X-ray Report:* No gallstone shadows recognized. No abnormality noted in the right upper quadrant.

Operative Findings: Gall bladder not distended, easily compressible, normal in color and consistency, but containing ten gallstones the size of a navy bean.

CASE N.M.—*X-ray Report:* No gallstone shadows recognized. Pyloric end of the stomach deformed by some extraventricular process, probably with adhesions. Hyperperistalsis. Marked delay in the emptying time (26 hours plus). Duodenal bulb markedly deformed, as by extraduodenal pressure. A large, subhepatic tumor, apparently the gall bladder.

Operative Findings: Gall bladder very greatly distended, hard, whitish at the fundus, containing 400 cc. of brownish-colored fluid, and twelve pea-sized cholesterin gallstones. No record as to the gall-bladder adhesions.

CASE B.M.—*X-ray Report:* No gallstone shadows recognized. Hepatofixation of the stomach and hepatic flexure.

Operative Findings: Between four and five hundred stones, light yellow in color, probably cholesterin.

CASE J.L.—*X-ray Report:* Extensive right upper-quadrant adhesions, involving the pylorus and duodenal bulb. These adhesions apparently originated in the gall bladder.

Operative Findings: Duodenum adherent to the gall bladder. Gall bladder full of stones.

CASE J.G.—*X-ray Report:* No gallstone shadows recognized. Stomach normal. Adhesions in the gall-bladder region, deforming the duodenal bulb. Definite localized tenderness over the gall bladder.

Operative Findings: Extensive adhesions all about the gall-bladder region, involving the duodenal bulb. Chronically diseased gall bladder. One pea-sized stone in common duct, several smaller stones in the gall bladder.

CASE E.W.—*X-Ray Report:* Stomach and duodenal bulb roentgenologically normal. No gallstone shadows recognized. Definite point of pain on pressure over the gall-bladder region.

Operative Findings: Stomach and duodenum normal. The gall bladder contained nineteen cholesterin stones, ranging in size from a grain of wheat to a filbert.

CASE C.K.—*X-ray Report:* No gallstone shadows recognized. Case of carcinoma of the pylorus, involving the duodenum and pancreas.

Operative Findings: Carcinoma of the pancreas with secondary involvement of the liver. Pylorus and duodenum involved in the carcinomatous mass. Probaby one gallstone in gall bladder (not certain).

CASE S.C.—*X-ray Report:* Stomach roentgenologically normal. Adhesions in the gall-bladder region involving the first portion of the duodenum, but not interfering with the emptying time of the stomach. No gallstone shadows recognized.

Operative Findings: Cholecystectomy. Gall bladder buried in adhesions, containing several large cholesterin stones.

Conclusions. Summarizing the findings of the above tabulations, particularly Tables III and IV, we see there is considerable compensation for the fifty per cent. failure of the roentgen method to make a definite diagnosis of gallstones in proved cases of cholelithiasis. In only four of thirteen cases of proved gallstones where the *x*-ray examination was negative did the *x*-ray report fail to give evidence of a gall bladder lesion. In only three of the fourteen cases with the roentgen report suspicious of gallstones, but where no stones were found at opera-

tion, was the gall bladder found normal at operation.

Including the forty-one operated cases in which gallstones were found, and the fourteen cases in which the roentgen report was "suspicious of gallstones," I have a series of fifty-five cases of gall-bladder disease, some without stones, in forty-eight of which *x*-ray evidence pointed definitely to the gall bladder. We may, therefore, conclude that it is possible to definitely show gallstones in fifty per cent. of positive cases, and to show roentgen evidence of gall bladder lesion in eighty-eight per cent. of cases of gall-bladder disease.

Of course, from the *x*-ray examination it is not possible to make a positive declaration as to the absence of gallstones. Many patients are not operated. Percentages on this point would be extremely misleading. Hence I have refrained from expressing my negative findings in percentages except to show the absurdity of such statistics. The point I wish to make is that gallstones are demonstrable with much greater frequency than has until recently been conceded. The frequency with which stones may be shown is so great that I believe the time has arrived when the *x*-ray examination should be required in every suspected case.

THE ROENTGENOLOGIC DIAGNOSIS OF DUODENAL ULCER*

BY RUSSELL D. CARMAN, M.D., MAYO CLINIC, ROCHESTER, MINN.

THERE has been a sharp divergence of opinion among some of us as to the relative importance of certain roentgenologic manifestations noted in association with duodenal ulcer. This discordance, I believe, can be considerably lessened, if not wholly removed, by a frank presentation of the subject.

Deformity of the bulb, first pointed out by Dr. Lewis Gregory Cole as a roentgenologic sign of duodenal ulcer, and which has received the unqualified endorsement of George and others, has been regarded with skepticism by some of us. Heretofore, I have been among those who could not share Dr. Cole's enthusiasm, and have freely expressed the opinion that bulbar deformity, though of occasional diagnostic value, should be ranked among the secondary signs. During the past year my experience with this sign has led me to regard it with much greater favor. Though I would not even yet place exclusive reliance upon cap distortion for diagnosis, I believe it only fair to say that I now consider this sign to be one of our best indices, capable of practical application, and well worth searching for in those cases in which the more simple methods of examination fail to establish or exclude the presence of duodenal ulcer.

On previous occasions I have called attention to the following handicaps to the diagnosis of duodenal ulcer on bulbar deformity:

1. That irregularities of the duodenal outline are not pathognomonic of ulcer or even of a duodenal lesion, and that such distortion may be due to adhesions from some other process such as a pericholecystitis, or to spasm excited by a remote lesion.

2. That some ulcers of the duodenum do not produce an organic distortion which is roentgenologically demonstrable.

3. That adequate filling of the duodenum with the opaque meal, and hence its effective visualization, is not always easily obtained, since it depends on the ratio between the amount passing the pylorus and the rate of duodenal evacuation, which is not controlled by any distal sphincter.

Each of these objections I still consider valid. How then can they be reconciled with my present belief that bulbar deformity

*Read before the American Roentgen Ray Society, Atlantic City, Sept. 22-25, 1915.

is one of our best indications of duodenal ulcer?

In the first place, while irregularities of the duodenal contour may be sometimes produced by pericholecystitis and other adhesion-producing lesions, or by spasm reflected from distant sources, deformity due to such causes is much less common than deformity resulting from duodenal ulcer. A knowledge of the clinical history will often put the roentgenologist on guard for these possibilities. But distortion of the duodenal bulb by extra-duodenal adhesions is probably less frequent in fact than in theory. I can recall at least one instance in which the duodenum was matted in adhesions, yet showed a normal bulbar contour on the plate.

In the second place, while some duodenal ulcers produce a scar-distortion of the duodenal lumen which can be readily seen on the roentgen plate, there are others in which the organic deformity is so slight that it cannot appreciably distort the barium shadow. I refer especially to the small mucous or slit ulcers which are occasionally found at operation. In these there is only a slight inflammatory thickening which is not visible when the duodenum is exposed. The surgeon recognizes the ulcer by the sense of touch and by stippling produced by rubbing the serosa with the finger or gauze. The disproportion between the amount of distortion that Doctor Cole was demonstrating on his plates and the amount that I was customarily seeing at operation made it most difficult for me to accept his theory. However, when we began to employ the serial method, our plates also frequently showed bulbar deformity greater than could be explained by the pathologic condition seen at operation when the patient was relaxed by the anesthetic. The deformity of the bulb in such cases is, I am satisfied, chiefly or largely the result of spasm, exactly similar to the incisura of gastric ulcer or the spastic distortion of the pars pylorica so often seen associated with prepyloric ulcers. On this hypothesis it is possible to understand why the distortion of the bulbar shadow is out of proportion to the organic alteration and of a more exaggerated character. Absence of spasm would also explain why in some cases of ulcer no cap deformity can be demonstrated—an experience which has happened to others than myself.

In the third place, with the patient standing, the position we heretofore chiefly employed, the duodenum frequently cannot be well visualized because the barium passes through it too rapidly. But with the patient prone or on his right side the duodenum can often be filled and shown more effectively. Lippman,[1] working with Holzknecht, found some advantage in using the "distinctor" for blocking the duodenum in order to render it visible during the screen examination. With patients whose abdominal wall is relaxed we are sometimes able to dam up the duodenal contents by manual pressure during the vertical screen examination. However, the recumbent position will usually bring out the duodenal contour better both for screening and plating. Even by this method there is frequently considerable difficulty in obtaining a well-filled bulb, and repeated plating or a second examination is sometimes necessary.

Regardless of explanations, theories and opinions, the fact remains that for a year past we have satisfactorily tried out the serial method, though modifying it in some particulars. During this period our diagnoses of duodenal ulcer have been confirmed at operation with fewer exceptions than before, and fewer ulcers have escaped diagnosis. We have not limited ourselves to this method exclusively, but have simply added serial roentgenography of certain cases of suspected duodenal ulcer to our routine screen and plate examinations. We have found that it is not always necessary to make multiple plates. Under favorable circumstances the fact that the bulb is of normal contour can be determined by the screen inspection with the patient either upright or recumbent, preferably the latter. Con-

[1] Lippman, C. W.: "The Duodenum; a Roentgen Study." *Surg., Gynec. and Obst.*, 1914, xix, 724.

versely, constant bulbar deformity can occasionally be clearly demonstrated in the same manner. In making serial plates, the number made depends upon the result. In many cases we feel the examination can be terminated when as few as a dozen plates show identical and characteristic bulbar deformity, or when any one plate shows a normal bulb.

The definite bulbar deformities more or less characteristic of duodenal ulcer are of various types, among which the following are noteworthy:

1. General distortion with sharply outlined projections and incisura-like indentations, giving the cap the semblance of a miniature pine tree or a bit of branched coral. This sort of bulb almost always means duodenal ulcer. The distortion is largely organic; if partly due to spasm the latter element is persistent and unvarying. In many cases of this type the whole contour of the bulb is deformed; in others only one border or the basal portion is decidedly irregular. That a pericholecystitis or adhesions from other inflammatory processes in this vicinity may produce a similar deformity, must be admitted and should be kept in mind as a possibility. Cancer of the duodenum is so rare that it should be thought of last of all.

2. The niche type. The excavation of the ulcer is visible as a barium-filled recess in the bulbar chamber. It varies from a wheat grain to a pea, or larger, in size, and its barium content is often denser than that in the rest of the bulb. The niche may or may not be accompanied by spastic incisuræ.

3. The incisura type of deformity. The incisura may be single or bilateral. It is usually small but sharply outlined, is evidently spastic and presumably occurs in the plane of the ulcer. As a rule it is significant of ulcer, but we have had one case in which delicate adhesions confined to the anterior duodenal wall were the cause.

4. A fourth variety is a bulb represented by a very small but compact mass of barium. There is no particular irregularity of contour, but the bulbar shadow is abnormally small. Occasionally it is produced by a contracting stenosing ulcer. The duodenum of a steer-horn stomach, which often turns rather abruptly backward, may also give this sort of shadow in the antero-posterior view. In other instances there is perhaps a scant exit of barium through the pylorus, or rapid duodenal clearance, or both. When due to obstructing ulcer, six-hour retention, hyperperistalsis and antral dilatation are also present. In the absence of these signs continued plating should finally show a normal bulb.

In a small percentage of the cases, the bulb shows indefinite shading off here or there, but without sharply outlined or permanently localized irregularity. In other words, while no normal filled cap is seen on any plate, the observer feels quite uncertain whether the bulb is actually irregular or is only partially filled. By repeated plating or reëxamination at a subsequent time a completely filled cap, usually of normal contour, may be obtained.

What, then, shall be done with the other roentgenologic signs of duodenal ulcer? Shall they be discarded as worthless? By no means. Let us invoice them again:

1. Duodenal diverticulum.
2. Gastric hypertonus, hyperperistalsis and hypermotility.
3. Six-hour gastric residue.
4. Antral dilatation.
5. Gastrospasm.

Either true or false diverticula result occasionally from duodenal ulcer. In the true type all the coats of the duodenum are preserved in the sacculation. True diverticula are relatively rare, being found in less than one per cent. of the total number of ulcers. False diverticula result from perforation of the ulcer and excavation of adjacent tissue. These are somewhat more common than true diverticula. Both types are recognizable roentgenologically, and, when present, constitute an excellent sign of duodenal ulcer.

The triad of "hypers," namely, hypertonus, hypermotility and hyperperistalsis, was

given early recognition by the pioneers in roentgenology as being more or less valuable indications of duodenal ulcer. These phenomena are seen in various combinations, often all together. Gastric hypertonus as an accompaniment of duodenal ulcer may be explained upon either one of two grounds: First, it may occur as a spastic increase of tone which stops short of the general reflex gastrospasm, familiar to us as a sequence of numerous conditions outside the stomach. Second, it may result from the effort to overcome beginning stenosis of the duodenum. Whatever the reason be, hypertonus is seen with the majority of duodenal ulcers, and perhaps more frequently in this than in any other condition. True, it occurs also as a normal feature of the steer-horn stomach seen now and then in persons of the broad habitus, and is an occasional accompaniment of various pathologic conditions within and without the stomach.

Gastric hyperperistalsis is notable in a large proportion of cases, perhaps 60 per cent. or more. It varies in intensity from a slight exaggeration of wave-depth to a tempestuous energy of contraction, depending upon the degree of obstruction. A distinctive feature is the regular succession and symmetrical correspondence of the waves on both curvatures. Three or four pairs may be seen in progress at once, whereas, with the media which we employ, only one or two pairs are commonly seen normally. Hyperperistalsis is often intermittent in character, periods of activity alternating with periods of rest. Its appearance is also sometimes a little delayed after the stomach is filled, not usually, however, beyond five or ten minutes. Of course, we are all aware that the phenomenon of hyperperistalsis is not limited to duodenal ulcer. It may exceptionally accompany lesions of the gall-bladder or appendix, or be seen normally in the hypertonic steer-horn stomach, but in any of these, as a rule, is less pronounced than in duodenal ulcer. The exaggerated peristalsis, which can sometimes be elicited by massage of the epigastrium, or palpating a tender appendix, soon dies away when the stimulus ceases. Obstructing pyloric and prepyloric lesions are sometimes attended by hyperperistalsis, but this is nearly always of a disorderly character as to the depth and sequence of the waves, and the greater curvature is chiefly affected. This sort of exaggerated hyperperistalsis sometimes accompanies duodenal perforation. In estimating the degree of peristaltic activity it is to be remembered that peristalsis is more lively in the recumbent than in the standing posture, and that it is influenced by the character of the opaque meal. Comparisons should be made under identical circumstances.

A logical result of hypertonus and hyperperistalsis is hypermotility, if no obstruction has been produced by the ulcer. Rapid clearance of the stomach is also furthered by the free patency of the pylorus so often observed. During screen inspection the barium is seen passing out into the duodenum in a copious stream, not quite so voluminous as that remarked with the gaping pylorus of cancer, but larger than normal. The head of the six-hour meal instead of being in the cecum or ascending colon, as normal, may be in the transverse or even in the descending colon. Again, it is to be conceded that hypermotility is not peculiar to duodenal ulcer and that it is a common effect of gastric cancer, achylia and the diarrheas. If these be excluded, as can usually be done by considering the salient roentgenologic and clinical facts, a pronounced hypermotility should strongly suggest the possibility of a nonobstructing duodenal ulcer being present.

On the other hand, more than one-fourth of these ulcers are sufficiently obstructive to produce a six-hour retention in the stomach. The testing of motility by a modification of Haudek's double-meal method has become an indispensable part of our routine. A six-hour retention in a stomach with an unbroken contour, that is to say, without any roentgen evidence of gastric ulcer or cancer, should first of all suggest duodenal

obstruction, the most common cause of which is duodenal ulcer. If, in addition to the gastric retention, there is typical gastric hyperperistalsis, the presence of a duodenal ulcer is well-nigh certain. In short, we consider the combination of these two signs as being quite as diagnostic as any other evidence that can be obtained, not even excepting bulbar deformity. Dilatation of the antrum, while simply one of the later manifestations of obstruction in the vicinity of the pylorus, should at least arouse suspicion of obstructive duodenal ulcer, since this is a frequent cause.

Spastic manifestations in the stomach, such as migratory incisura or a temporary hour-glass, are merely indicative of an irritable focus which may or may not be an ulcer in the duodenum.

The value of these indirect signs depends considerably upon their frankness, their combinations with each other, and their concordance with the general aspects of the case. Hyperperistalsis, of a pronounced and characteristic type, is alone worth perhaps 60 per cent. for diagnosis. Backed by a good clinical history it has still greater value, but there remains a small number of cases in which this combination results from disease of the gall bladder or appendix, so that it is more conservative to carry out the serial examination in addition. There is always this to be said of indirect signs, that where they fall short of establishing a diagnosis they contribute to diagnostic certainty or, at all events, guide the observer in the right line of inquiry.

At the risk of being tedious I wish to re-emphasize a point I have often mentioned, namely, that the examiner should be acquainted with the history and clinical data in every case. With this knowledge he is enabled to direct particular attention to the most probable seat of trouble; his opinion is, as it should be, tempered by all the facts, and he is less likely to err in his conclusions. I would not be understood as saying that the roentgenologist should base any diagnosis on the history only, or even chiefly. The clinician can do that. Nor do I mean that a contradicting history should swerve the roentgenologist when his own evidence is conclusive. We all recognize the fact that the history of duodenal ulcer is not always typical. We know, further, that the typical symptoms of duodenal ulcer are sometimes exactly imitated by those of a chronic appendicitis or cholecystitis. But the anamnesis and clinical data in most instances are more or less directive and eliminative. They may often assist in differentiating between bulbar deformity produced by the adhesions of a pericholecystitis, by reflex spasm, and by duodenal ulcer. A correlation of all the findings is advisable, as a rule.

In short, I believe that no diagnosis can be too strongly fortified, and that any gross discordance between the findings from all sources should make the examiner cautious in his opinions. As a corollary of this I believe that we should not pin our exclusive faith to any single method of examination. Rather, I think, should we make use of every technic that offers help, and weigh the results as a whole.

COLLARGOL INJECTION OF THE UTERUS AND TUBES

BY C. GOTTLIEB, M.D.,

SERVICE OF DR. I. C. RUBIN, BETH ISRAEL HOSPITAL, NEW YORK

UTERINE cavity and lumen of Fallopian tubes, visualized by collargol injection. 3 c.c. of 10 per cent. collargol were used.

Patient, 32 years old, nullipara, left-sided parovarian cyst the size of a grapefruit. Note elevation of left tube, as compared with the downward direction of the right tube.

The right ovary was found prolapsed at the laparotomy, confirming *x*-ray findings.

The right tube was closed at the fimbriated extremity, the fimbriated end of the left tube was found patent, and permitted the escape of a small amount of collargol into the peritoneal cavity.

No post-operative febrile reaction, no pain or discomfort at the time of injection, or afterward. Roentgenogram, one week later, failed to reveal presence of collargol.[1]

[1]For a detailed description of a series of collargol injections of the uterus, etc., refer to article by Dr. I. C. Rubin, in *Surgery, Gynecology and Obstetrics*, April, 1915, on "X-Ray Diagnosis in Gynecology, with the Aid of Intra-uterine Collargol Injections."

A NEW TIMER FOR ROENTGENTHERAPY

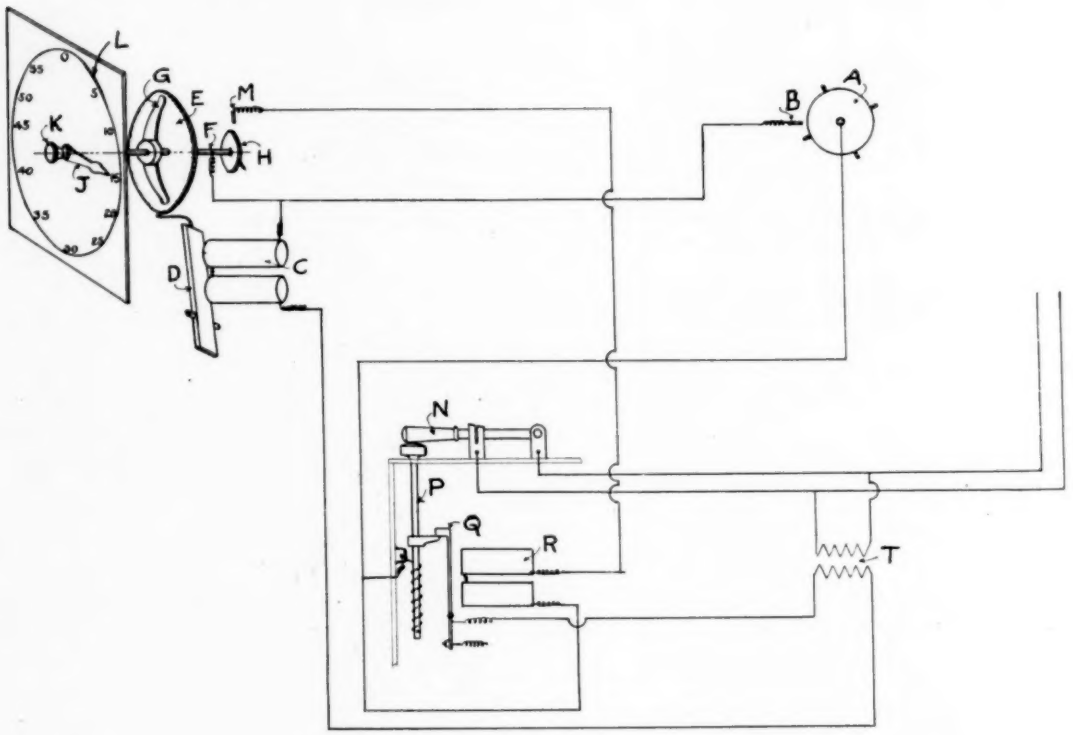
BY ROLLIN H. STEVENS, M.D., DETROIT

FOR years we have been trying to find in the market a reliable timer for roentgentherapy, but none was to be found, because there was apparently not sufficient demand for one.

No factor in roentgentherapy is more important than the time factor. No factor in the professional direction of roentgen treatment is so unreliable as the time factor of the human mind. Especially in deep therapy, where the treatments are divided into so many small intervals, is the time factor important.

We have finally, through the coöperation of Mr. Arthur Birdsall, Electrical Engineer, and Mr. Frank Roehm, Clockmaker, produced a timer which has been giving us such a degree of comfort in roentgen treatment, because it is absolutely accurate to the second and never fails to operate, that we publish herewith a description for the benefit of our co-workers. With it installed one may devote time to other matters during the time of treatment with the assurance the timer will shut off the current at the proper second. There can be no mistake about the length of time your patient is treated.

With a Coolidge tube, a standard milliamperage, voltage, filter, distance and time, the keen necessity of dose measurement is greatly simplified, especially in these days when fresh pastilles or photographic strips are unobtainable.



DESCRIPTION

A is the "second" wheel of a pendulum, weight driven clock with second hand. On this "second" wheel are four points 90° apart. One of these makes an electrical

contact with a fifth point "B" every 15 seconds.

"C" is a magnet in circuit with the clock, of which "D" is the armature.

"E" is a wheel, loose on the shaft "F." This wheel has 240 teeth or one tooth for every 15 seconds in an hour.

"G" is a friction spring, rigidly attached to the shaft "F." Also attached to "F" is a small wheel "H" with a contact point, a hand "J" and a thumb nut "K." The dial "L" is divided into half minute divisions from "O" to 60. These half minute divisions are far enough apart so that the hand "J" may be easily set to 15 second intervals if desired. The hand "J" is adjusted so that at the moment it points to "O," the point on "H" will come into contact with "M."

"N" is the switch controlling the current to the transformer, rectifying wheel, and *x*-ray tube.

"P" is a plunger rod with spring, which opens the switch "N," when released by the armature "Q," of the magnet "R."

"T" is a low voltage transformer, one side of which is connected to the main line from the alternating current generator. The other side supplies the current to operate magnets "C" and "R."

The operation is as follows—By means of the thumb nut "K" the hand "J" is set to the time desired for the *x*-ray treatment, as indicated on the dial. This also turns "F," "G" and "H," but does not turn "E," which is held stationary by the spring on armature "D."

Plunger rod "P" is now pushed down and is held in place by "Q." This completes the circuit and when one of the points on the clock wheel "A" makes contact with "B" a current passes through "C" and pulls "D" to it. This turns the wheel "E" by means of the toothed spring on the end of the armature. The armature is adjusted so that "E" is advanced one tooth, or 1/240th of its circumference, each time the armature is actuated by "C."

By means of the friction spring "G," this movement of "E" is transmitted to shaft "F."

Switch "N" is then closed, closing the circuit from the alternating generator and starting the *x*-ray tube.

At the end of the predetermined time the point on "H" reaches "M," contact is made, and current passes through magnet "R" pulling armature "Q" and releasing "P," which flies up and opens "N," thus shutting off current from the entire apparatus.

TREATMENT OF CARBUNCLES BY THE ROENTGEN RAY

BY KENNON DUNHAM, M.D.

VISITING PHYSICIAN CINCINNATI TUBERCULOSIS HOSPITAL, CHIEF OF CLINIC ON TUBERCULOSIS, MEDICAL DEPARTMENT, UNIVERSITY OF CINCINNATI

I WISH to make a preliminary report of the successful treatment of 67 consecutive carbuncles, by means of the roentgen ray. I called attention to this treatment at the meeting in Chicago last February.

The only reference I have been able to find upon this subject is entitled "Odds and Ends of *X*-ray Work, Including Some Cases of Carbuncle," by R. R. Coyle, M.B., G.M., *Medical Electrology and Radiology*, Vol. 7, 1906, page 139. His description of the effects of the *x*-ray treatment upon the carbuncle are so strikingly similar to my own results that there can be no doubt of the accuracy of his report. I further wish to give credit to Dr. Wainwright, Scranton, Pa., who called my attention to this subject at the last meeting of our society in Boston. The treatment as I administer it consists of one full therapeutic dose with the Coolidge tube, target distance 8 inches, through 3 mm. of aluminum with a 9-inch spark gap.

This requires about 35 milliampere minutes and gives more than 10 Kienböck units. Only one such exposure is required provided the entire induration has been exposed. The results: within less than 48 hours the entire clinical condition of the patient has changed. The first night after the treatment the patient is usually more restless and sometimes believes that the treatment has done him harm, but the second night he sleeps well. The infected area ceases to be painful and the infected part can be moved without distress. From now on the object of the treatment is to prevent reinfection.

Sometimes the induration is gradually absorbed with little or no discharge. At other times it breaks down and discharges through the numerous sinuses, but usually a large carbuncle will soften up and take on the appearance of an abscess. In such cases it is a very simple matter to lance it and permit free drainage.

Almost no scar results after this method of treatment.

I have applied the treatment to palmar abscesses of the streptococcic type with excellent results. I have hoped to apply it to a felon, but no such opportunity has presented itself.

Apparently it is the streptococcic infections that receive the most benefit.

Nothing in all roentgentherapy gives such positive and uniformly perfect results as the treatment of a carbuncle. It is most important to know how the *x*-ray brings about this result. Some fundamental *truth* underlies this simple observation, which I hope when fully understood will have a broader therapeutic application than the treatment of carbuncles.

ON FILE

Professor *X*-Ray led me through
His dim Laboratory,
And I with interest listened to
Remarks explanatory.
The skiagrams so weird and grim
Were ranged in many a pile;
'Twas natural to ask of him
"Whence all these plates, on file?"

This speedy answer made it clear,
Unto my vague and wondering mind:
"Ten thousand patients passed through here,
And each one left his *shade* behind!"

P. P. G.

THE AMERICAN JOURNAL OF ROENTGENOLOGY

PUBLISHED BY PAUL B. HOEBER, NEW YORK CITY

Issued Monthly. Subscription, $5.00 per year. Advertising rates submitted on application. Editorial office, 32 Adams Avenue West, Detroit, Mich. Office of publication, 67–69 East 59th Street, New York

OFFICIAL ORGAN OF
THE AMERICAN ROENTGEN RAY SOCIETY

President
DR. A. W. CRANE, 420 S. Rose St., Kalamazoo, Mich.

First Vice-President
DR. W. B. BOWMAN, Los Angeles, Calif.

Second Vice-President
DR. ROBERT W. GIBBES, Columbia, S. C.

Secretary
DR. W. F. MANGES, 264 S. 16th St., Philadelphia, Pa.

Treasurer
DR. WM. A. EVANS, 32 Adams Av. W., Detroit, Mich.

Executive Committee
DR. ROLAND HAMMOND, Chairman, Providence, R. I.
DR. H. W. VAN ALLEN, Springfield, Mass.
DR. DAVID R. BOWEN, Philadelphia, Pa.

Publication Committee
DR. G. M. MACKEE, Chairman, New York City
DR. EDWARD H. SKINNER, Kansas City, Mo.
DR. GEORGE C. JOHNSTON, Pittsburgh, Pa.

Librarian
MR. H. W. DACHTLER, Toledo, Ohio

Editor
DR. P. M. HICKEY, 32 Adams Av. W., Detroit, Mich.

Associate Editors
DR. E. W. CALDWELL, New York, N. Y.
DR. R. D. CARMAN, Rochester, Minn.
DR. JAMES T. CASE, Battle Creek, Mich.
DR. A. W. GEORGE, Boston, Mass.
DR. G. E. PFAHLER, Philadelphia, Pa.
PROF. J. S. SHEARER, Ithaca, N. Y.
DR. F. C. ZAPFFE, Chicago, Ill.

EDITORIALS

The notice which was sent out in the last number of the Journal concerning the proposed lantern slide demonstration of roentgenograms to be given at the coming meeting of the American Medical Association in June has met with a very warm response and the Committee assures us that the prospects are very good for a most attractive series of demonstrations. A number of our prominent roentgenologists have signified their desire to participate and we can look forward to and expect the presentation of the best which the country affords in this line.

* * *

One of the problems which confronts the roentgenologist is the question of remuneration for his services. In certain parts of the country it is customary to adopt a standard fee bill and to have this published, and then make the charges in each case according to this adopted schedule. This has the disadvantage of not allowing one to charge for extra time and special work on individual cases. It furthermore has the great disadvantage of tending to commercialize roentgenology and rob it of its dignity as a branch of consulting medicine.

Another phase of the problem, which is not quite so easily disposed of, concerns the relation between roentgenologists and doctors or their families who become his patients. If the roentgenologist and the physician patient are co-workers, such questions naturally settle themselves. If, however, they are strangers, the patient feels his obligation and is often placed in a peculiar position if no charge is made for the services rendered. It has been our experience that the average physician prefers to pay for such services and dislikes to be placed under obligations to one who is not an intimate associate.

Physicians usually, we think, feel the disadvantage that they are under in calling for medical advice and services without the privilege of paying. We have met many instances where medical attention has been delayed on account of the diffidence of

physicians to ask for services which they knew would be rendered without charge.

This problem presents many difficult aspects and perhaps can not be solved by any general rule. Probably its solution awaits a natural adjustment which a courteous discussion of each case would involve. This is simply one phase of a problem which concerns the inter-relation of physicians.

Frequent examples occur where physicians, for instance, ill away from home, neglect to send for medical advice on account of this feeling. This is properly a subject which should come up before the Committee on Ethics of the American Medical Association.

SOCIETY PROCEEDINGS

THE New England Roentgen Ray Society tendered a dinner at the Harvard Club, Boston, Saturday, November 13, to Dr. Walter Dodd of the Massachusetts General Hospital, just returned from service in France with the first Harvard Medical unit.

Dr. Dodd besides relating personal impressions of his trip abroad interested the members by his description of the field hospital roentgen equipment he used, a coil excited by a 36-volt storage battery which developed something less than a milliampere. This he stated was quite sufficient for roentgenoscopy which he employed generally for localization of foreign bodies and good enough for plates, but requiring, of course, long exposure.

For localization of foreign bodies he used a metal ring on a handle which was moved about until it was over the foreign body. Then a mark was made on the skin and the patient was then turned in another plane and the same procedure followed, the foreign body thus being localized at the intersection of the two planes.

Dr. Dodd laid stress on the importance of the operating surgeon having the patient in the same position at operation as at the time of roentgen examination, otherwise the skin localization will be inaccurate. He instanced one case of neck injury where the operating surgeon complained that he went in at the site of the skin marker and could find no foreign body. Dr. Dodd found that the anesthetist held the patient's head turned to one side. When it was returned to the median line, the position it was in at the time of the roentgen localization, the surgeon then went in guided by the skin marker and at once came upon the foreign body.

Expressing himself "as neutral as any pro-Englishman can be," Dr. Dodd impressed all by his genuine scientific spirit which was graphically portrayed in his running to earth of a so-called atrocity.

While at camp, a Belgian refugee boy of 9 years won the hearts of the allied soldiers by claiming to have been crucified by a Uhlan. He displayed apparent bayonet wounds of the hands. Dr. Dodd asked him in what position his hands were when bayoneted and he placed one over the other before his body. Since the scars were only on the dorsal side of the hands it was evident he was not wholly honest for at least one palm would have to have shown a scar which was not the case.

He then took the boy to the roentgen department and on examination found a congenital deformity of the metacarpals with evidence of an old tubercular or specific dactylitis which had evidently been operated upon and was the real cause of his so-called bayonet wounds.

FRED'K W. O'BRIEN,

Boston.

CORRESPONDENCE

(While the Editors of the Journal would reserve the right to answer privately questions concerning diagnosis and treatment, they feel that where such communications are of general interest their publication would enhance the reading pages of this publication.)

To the Editor:

American Journal of Roentgenology.

Dear Sir:

. . . . I have had a patient under treatment for two large ulcers (tuberculous) near the anus, for one month. The following treatments have been given:

March 16, 1916.—One milliampere, five minutes, target twelve inches from ulcer. No filter.

March 21, 1916.—Eight milliampere-minutes, distance twelve inches. No filter.

March 24, 1916.—Eight milliampere-minutes.

March 28, 1916.—Ten milliampere-minutes.

April 1, 1916.—Ten milliampere-minutes.

April 5, 1916.—Ten milliampere-minutes.

April 10, 1916.—Ten milliampere-minutes.

April 15, 1916.—Twelve milliampere-minutes.

The patient has received eight treatments, as stated above, and the ulcers are just the same as they were before this treatment was begun.

Do you not think these treatments should have had some effect on the lesions, or is it generally considered better to use a single large dose or several larger doses and less frequently?

What "method for estimation of dosage" is considered the best at this time?

The above letter was submitted to one of the Editorial Staff, who writes as follows:

". . . . Answering the correspondence concerning the patient with two large tuberculous ulcers near the anus, I feel very much that this correspondence will not be always profitable because men give insufficient data and expect definite answers. However, I should say this:

"The doctor omits mentioning the voltage or the length of the parallel spark gap, which would give some idea of the relative value of the rays used, but, presuming that this parallel spark was approximately six inches, the following criticisms can be made:—the total amount of treatment is insufficient; the rays were too soft, and they should have been thoroughly filtered. I think, too, that the treatments were given unnecessarily often.

"I would recommend that the general area be divided into two fields by a line running directly through the sinuses, and the untreated field sharply separated by lead from the area treated. I would then use twenty milliampere-minutes with a focal distance of eight inches, with a parallel spark value of nine inches, and with five millimeters of aluminum as a filter, and would treat the patient once a week, alternating the fields."

DEPARTMENT OF DENTAL ROENTGENOLOGY

EDITORS

GEORGE MACKEE, M.D., AND JOHN REMER, A.M., M.D., NEW YORK

THE ROENTGEN RAY IN DENTAL PRACTICE

BY ARTHUR H. MERRITT, D.D.S., NEW YORK

THE roentgen ray fills an important place in dentistry. In diagnosis and as an aid in certain forms of treatment, it has become indispensable. Without its use it is impossible to meet the present requirements of daily practice. It is doubtful whether these requirements can be met by the dental practitioner, and it is often a question of doubt how much he should depend upon the roentgenologist for examinations of this kind. So dependent is he upon its aid, that much of the routine work must be done in his own office if he expects to do his whole duty by his patients—a fact coming to be more generally recognized each year by the dental profession.

PERIAPICAL INFECTIONS

Probably its widest field of usefulness in dental practice is in the light which it throws on infections taking place at the apices of non-vital teeth. Such infections frequently occur which the most painstaking examination, unaided by the roentgen ray, fails to reveal. Not until its introduction was there any idea of the frequency and extent of these infections. The result has been to revolutionize the treatment of such teeth. When a tooth pulp loses its vitality (the most common cause being deep-seated caries) it is only a question of time when it becomes infected. This infection frequently takes place through the mouth, though hematogenous infections may and, not infrequently, do occur. The products of infection find their way into the mouth, or through the foramen, into the body of the bone. Whether this infection produces symptoms that are acute or chronic, will depend in large measure upon the number and virulency of the organisms engaged. Acute cases are attended with severe pain, swelling, temperature, loss of appetite, etc. With the discharge of pus, the acute symptoms subside. Unless interfered with the infection assumes a chronic form, the so-called "gum boil" being the only visible evidence of its existence. In this stage there is no pain and the patient is usually unconscious of its presence. The fistula may or may not persist. Such infections may occur and even establish a fistula without pain. The most common type is the one which takes place without local symptoms and without direct communication with the mouth. This is known as the blind dental abscess, and may occur at the root end of any non-vital teeth, and give no hint of its presence.

Roentgenographic examinations of these infections show that they are progressive, beginning as a slight rarefaction of limited area at the root end, which may in time greatly increase in size, causing complete solution of bone with cavity formation, which in the case of the so-called blind abscess has no direct communication with the mouth. A differential diagnosis between the fistulous and blind dental abscess cannot be made by the roentgen ray. Nor does the roentgenographic and clinical examination always agree. An insignificant rarefaction may be, clinically, an active fistulous abscess of long standing. Serious secondary infections may result from a non-vital tooth which roentgenographically appears to be normal. Correct interpretation cannot, therefore, be made by one un-

familiar with the clinical history of any given case. This fact cannot be too strongly emphasized. To attempt to make a diagnosis or to outline treatment based on roentgenographic examination, is never wise. It is not only quite apt to be wrong, but may seriously mislead the clinician not versed in roentgenographic interpretation. The following interpretation received by the author while preparing this article and written by a roentgenologist with no clinical experience in dental practice, illustrates this point. "I believe that the first bicuspid in the right upper jaw should be removed; that the left canine should be properly filled and the bridge readjusted; that the pericementitis involving the two lateral incisors should be treated; that the right second bicuspid in the lower jaw should either be removed or the filling removed and the tooth treated." This is an excellent example of what a roentgenographic interpretation should *not be,* as the diagnosis was incorrect, and the treatment outlined wholly wrong.

FIG. 1. BLIND ABSCESSES, SHOWING COMPLETE LOSS OF BONE.

Wholly free from any local symptoms.

FIG. 2. FISTULOUS ABSCESS, SHOWING REGENERATION OF BONE EIGHT MONTHS AFTER CURETTEMENT AND ROOT AMPUTATION.

The first requisite to the successful treatment of these abscesses is the removal of the gangrenous tooth pulp, sterilization of the root canal and filling of same to the end—preferably with a material that is impervious to the roentgen ray, gutta percha being a filling of that nature and the one in general use. To accomplish this it is desirable to make a roentgenographic examination of the root before treatment is begun, a second examination after it has been cleansed and sterilized, with a wire in place to make certain that it has been properly prepared, and a final examination after the root filling has been made, to make sure that it extends to the end and seals the root. Without the aid of the roentgen ray, it is impossible in any given case to be certain that the operation has been properly performed. And since every non-vital tooth not so treated and filled must be regarded as a potential danger to the health and well being of the patient, the importance of the roentgen ray in such cases must be obvious. The removal of the infection in the root canal does not necessarily clear up the abscess, though it is the first step to that end in any effort to save the tooth, and prevent recurrent infection. In such cases the abscess must be reached through the alveolar process. Under a local anæsthetic (novocaine by the conductive method being most satisfactory), the gum over the abscess is laid back exposing the bone. If the abscess be a fistulous one, the opening into the cavity will be observed, which should be enlarged with curette or bone drill, and that portion of the root extending into the abscess cavity should be amputated. This is best done with bone drills. The cavity is then cleaned out with curettes, packed with sterile gauze, and allowed to heal from the bottom. In some instances, this cavity will subsequently fill in with an osseous deposit, which, roentgenographically, is not unlike normal bone. It is probable that this does not occur in

all cases. Clinically, it seems to be immaterial, as the parts appear healthy and the tooth is restored to usefulness. The sterile and well-filled non-vital tooth is in no sense a menace to the general health. To urge their indiscriminate extraction, as is sometimes done by the internist, is usually unwise. There may be cases where the secondary symptoms dependent upon the neglect to properly care for these infections, justify the extraction of the offending teeth. This should not be done, however, until all the evidence for and against such a course has been carefully weighed. Nor should these foci be eliminated until the question of obtaining cultures for autogenous vaccines has been carefully considered. It not infrequently happens that serious secondary infections result from chronic and wholly unsuspected infections in the mouth, and which do not clear up with the removal of the exciting cause. This fact should lead one to consider, in every case, the possible desirability of obtaining cultures before the mouth focus has been eliminated, making it impossible to obtain such cultures. Unfortunately, there is no data available showing the value of vaccines in the treatment of these secondary infections. In some instances the results seem to be brilliant. In others again they are negative, due no doubt to mistaken diagnosis or faulty technique. It is not easy to obtain pure cultures in these cases, particularly in blind abscesses, but it can be done if proper care be observed. The organism most commonly associated with these infections is one of the strains of the streptococcus. It is probable that in their immunity reaction, they differ with each case which, if true, would make stock vaccines of no value whatever. The importance therefore of obtaining cultures from each case will be obvious.

FIG. 3. PYORRHEA INVOLVING INCISORS AND MOLARS IN PATIENT EIGHTEEN YEARS OF AGE. Note absorption of bone about roots of teeth.

PYORRHEA ALVEOLARIS

Pyorrhea alveolaris is a disease in which the diagnosis is comparatively easy, making the roentgen ray, in consequence, less important than in periapical infections. It is a disease beginning in the sub-gingival

space, involving the alveolar process at this point, and extending, as the disease progresses, toward the root end, resulting in the final exfoliation of the tooth, if unchecked. While the diagnosis is not difficult, the prognosis in certain cases is often a matter of doubt, as in large measure it depends upon the amount of bone left supporting the teeth. It is here that the roentgen ray is helpful, though again its findings cannot overlooked in roentgenographic examinations. Successful treatment of these cases consists in thorough curettage of these pockets, with the maintenance of a high order of mouth hygiene. When this is done, and the bone loss is not such as to seriously weaken the teeth in their sockets, the prognosis is favorable. The bacteriology of pyorrhea is a mixed one, and does not differ qualitatively from that of the healthy mouth.

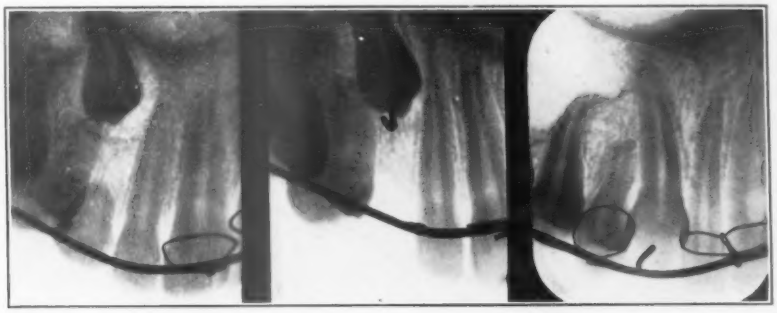


FIG. 4. UNERUPTED AND MALPOSED CANINE IN CHILD OF FIFTEEN.
Shown at different stages as it is being drawn into position.

FIG. 5. IMPACTED LOWER "WISDOM TOOTH" AT NEARLY RIGHT ANGLES TO NORMAL POSITION.

FIG. 6. UNERUPTED "WISDOM TEETH," SLIGHT IMPACTION OF LOWER.

with safety be separated from the clinical evidence. The bone loss in pyorrhea frequently takes place on one or two sides only of the four root surfaces. If this happens to be the labial or lingual surfaces, the roentgenogram will have the appearance of a normal tooth, whereas pyorrhea involving the approximal surfaces only, may, roentgenographically, lead one to believe that the case is hopeless. It rarely happens that the loss of bone about teeth involved in pyorrhea is uniform, a fact which should not be

There is no evidence that they sustain a causal relation to it, though they doubtless do complicate, and give rise to certain of its symptoms. The same may be said of the amœba.

MISSING AND IMPACTED TEETH

It frequently happens that teeth are missing in the dental arch, resulting in a more or less disfiguring mal-occlusion. In orthodontic treatment, it is of the utmost importance to determine the presence or ab-

sence of such teeth, with a view to bringing them into their proper place. Here is where the roentgen ray is of great value, as it not only determines beyond question their presence, or absence, but their relative position in the jaw. So in impacted teeth. The ray gives their position, shows whether infection has taken place, and greatly aids the exodontist in extraction.

FACIAL NEURALGIA

Obscure facial neuralgias may be caused by nodular growths within the tooth pulp. These are little osseous deposits which form in the body of the pulp, caused probably by some irritation of this organ, which by their pressure, cause indefinite pains along the

FIG. 7. UNERUPTED AND MALPOSED CANINE IN PATIENT OF THIRTY.

different branches of the trigeminus. Their density makes them relatively impervious to the roentgen ray, which becomes in consequence of great diagnostic value in such cases.

Hypercementosis is the term applied to bony enlargement of teeth roots which at times assume considerable size. These also may cause mild and not clearly defined pains about the teeth and face. Here again, the roentgen ray is of great diagnostic value, as there can be no mistaking such roots in the roentgenogram. Treatment in the first instance consists in the devitalization and removal of tooth pulp, and in the second, of the extraction of the enlarged root.

CLINICAL EXAMINATION SHOULD PRECEDE ROENTGENOGRAPHIC

It frequently happens that the physician, suspecting a possible mouth infection, refers the patient to the roentgenologist with—"Go and have your teeth *x*-rayed." This is unwise. As a rule, the clinical examination should precede the roentgenographic, for it may prove the latter to be unnecessary. It will at least make the roentgenographic examination an intelligent one.

It is not uncommon for patients to present themselves with roentgenograms of the entire mouth, made under the direction of the family physician which a careful clinical examination proved wholly unnecessary.

It is rarely necessary that the entire mouth be included. The diagnosis in pyorrhea is easily made. Periapical infections or so called dental abscesses, do not, with possible rare exceptions, take place on vital teeth. The roentgenographic examination should

FIG. 8. HYPERCEMENTOSIS.
Note marked enlargement of root of second bicuspid.

therefore, in suspected infections, be limited to non-vital or malposed teeth, the latter being chiefly third molars.

CONCLUSIONS

The roentgen ray is indispensable in dental practice.

Without its aid it is impossible to detect, in many instances, infections taking place in the periapical tissues.

In root canal work it must be depended upon to insure thorough operations.

In pyorrhea alveolaris it has a relatively limited place.

In missing and malposed teeth, it is absolute in diagnosis, as it is in detecting pulp nodules and hypercementosis, sometimes associated with facial neuralgia.

As a rule clinical examinations should precede roentgenographic.

ROENTGENOLOGIC EXAMINATION IN ELIMINATION OF THE MOUTH AS A SOURCE OF INFECTION IN SYSTEMIC DISEASE

BY E. J. EISEN, D.D.S., AND ROBERT H. IVY, M.D., D.D.S., MILWAUKEE, WIS.

THE etiologic relationship of chronic foci of infection in the mouth to certain forms of arthritis, neuritis, myositis, and other conditions in remote parts of the body, as demonstrated by numerous observers both clinically and in the laboratory, has rendered of the utmost importance an adequate examination of the teeth and contiguous tissues in patients suffering from these diseases. Most of the peridental lesions from which these systemic infections arise, occasion no local symptoms either subjective or objective, such as pain, swelling, etc., and therefore are often only revealed by means of the roentgen ray. In order to have its full value in cases of the type under consideration, the roentgenologic examination must be carried out following a clinical examination of the mouth to serve as a guide. The entire examination is best performed and interpreted by the same person, who should be well equipped in dental pathology and technique and whose general medical knowledge should render acceptable his judgment as to the bearing of the mouth findings upon the systemic condition present. Thus there is developed a specialty in diagnostic consultation. The physician does not merely send his patient to the roentgenologist for *x*-ray pictures of the teeth, taken in a haphazard way, which he possibly has to try to read himself or submit for interpretation to a third man, a dentist with no special knowledge of roentgenology, but obtains for his case under the plan outlined below, a comprehensive idea of the rôle played by the mouth as a source of the systemic infection. There are two principal types of foci of mouth infection which bear an etiological relationship to systemic disease.

(1) Periapical dental infection, i. e., disease about the apical ends of the roots of teeth.

(2) Chronic suppurative pericementitis or pyorrhea alveolaris. It is in the diagnosis of the former that the *x*-ray is of especial value.

EXAMINATION

Examination of the mouth of a patient under the circumstances indicated above, may be divided into several parts, each of which supplements or leads up to another. These several parts taken separately and not correlated into a whole, must be regarded as of little value in themselves. The routine mouth examination may be divided as follows:

(1) Clinical or visual examination.
(2) Determination of response of each tooth to the Faradic current.
(3) Roentgenologic examination.
(4) Microscopic or bacteriologic examination of pus if indicated.

(1) *Clinical Examination*

A preliminary general survey of the mouth and associated parts should be made before attempting to employ any of the more precise methods of diagnosis such as the *x*-ray. In this way the examiner obtains a clew as to the nature and extent of the roentgenologic examination required. Also the presence of pyorrhea, ulcerations, suppurating sinuses, swellings, enlarged lymph nodes or other abnormalities are noted. This is followed by the

(2) *Electric Examination*

The electric examination forms the deciding link between the clinical and *x*-ray examinations. Starting at the median line in the maxilla, each tooth in the mouth in succession is touched with the electrode from a Faradic battery (Fig. 1), and its response noted, as minus, plus, or doubtful. Crowned teeth are marked C, and missing teeth, M. This chart then forms the basis

of the roentgenologic examination which should be made in all cases showing devitalized, crowned, or missing teeth. The vital teeth can usually be ignored as they practically never are the seat of hidden apical disease.

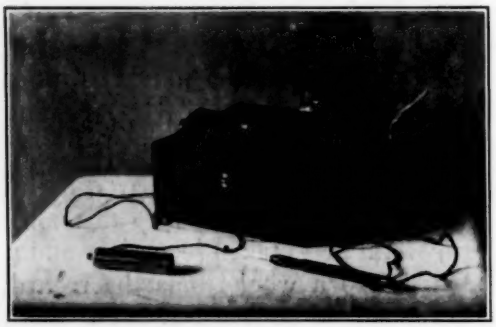


FIG. 1. ONE CELL FARADIC BATTERY, FOR TESTING VITALITY OF THE TEETH.

(3) *Roentgenologic Examination*

This consists of a plate (5 x 7) of each side, with films of teeth not responding to the current, crowned teeth, and any areas requiring special study as indicated on the plates. The reasons for covering each side with a plate first are as follows:

The examination should be impartial, with no preconceived ideas as to conditions that may be present. Unsurmised abnormalities are in this way discovered hidden in areas often impossible to cover with a film. A plate leaves no doubt in one's mind and in very many cases one is rewarded for the additional trouble. Besides, areas about lower premolars and molars are generally shown better in plates than in films. Each single area comprising teeth either crowned or negative to the electric current, is then covered with a film. The film gives one a picture, the opposite aspect of which is shown in the plate, this being due to the fact that the plate is an extraoral exposure, and the film intraoral. The plates of course do not cover the incisor teeth, these being examined by means of films alone.

By following this routine we have been rewarded innumerable times by the detection of unerupted teeth, especially third molars, cysts, roots in the antrum, diseased antra, foreign bodies, in fact the solution of the problem has often been given in a most dramatic manner. One of the fundamental principles of a general physical examination is the importance of surveying the whole body. In the same way in our special field we should examine the whole mouth instead of picking upon suspected areas here and there with films. (Fig. 2.)

TECHNIQUE OF ROENTGENOLOGIC EXAMINATION

(a) *Plates.*—Formerly in employing plates it was necessary to place the patient in a recumbent position, but this has now

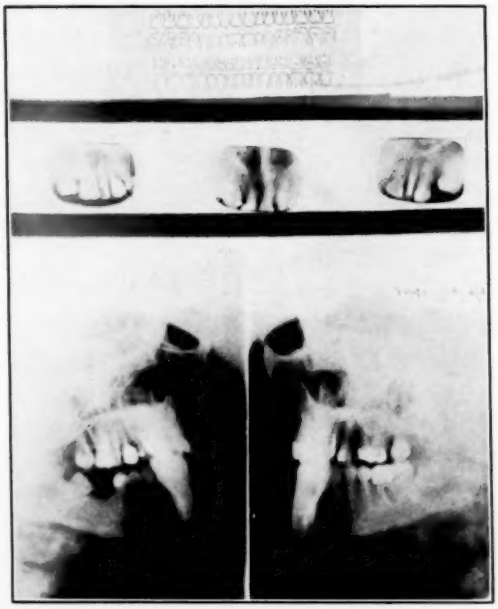


FIG. 2. RESULT OF ROUTINE EXAMINATION, COMPRISING CHART SHOWING ELECTRIC TEST, PLATES, AND FILMS.

been overcome so that the patient is placed in a sitting posture on a chair facing the stand. The stand shown in Fig. 3 is well known. To it has been added an attachment especially designed for dental roentgenography, consisting of a head clamp (Kelly-Koett) and plate rest. The plate rest is so constructed that its angle of inclination to the stand can be changed. The

FIG. 3. TUBE STAND, HEAD CLAMP, AND PLATE REST EMPLOYED IN MAKING X-RAY PLATES OF THE HEAD.

tube holder and funnel are tipped inwardly toward the stand so that the base of the funnel forms an angle of 15° with the plate rest, and can be drawn away from the stand to the full extent of the horizontal arm. The tube holder is now in proper standardized position for the exposure. The stand is adjusted in height, to make it possible for the patient to rest the head in the proper position without causing any uneasiness or strain. It is also tilted slightly downward in the direction of the occiput of the patient in order to bring the cervical vertebræ out of the field. The patient (Fig. 4) is now seated somewhat obliquely to the right or left of the stand and the head is laid upon the plate rest in

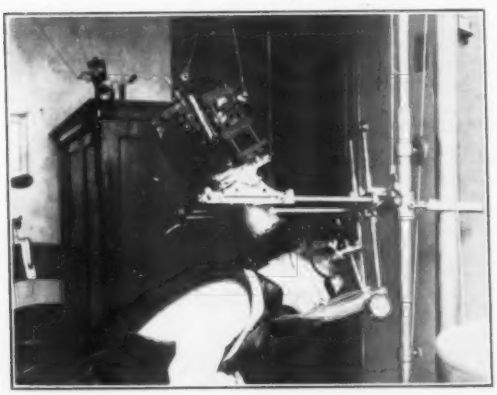


FIG. 4. POSITION OF PATIENT FOR PLATE OF UPPER AND LOWER TEETH OF LEFT SIDE.

such a position that the focal ray will pass through the mastoid process of the uppermost side of the head. Adjustment is facilitated by means of a pointer of wood running through the leather diaphragm of the funnel in the direction of the focal ray. This position brings the reverse side of the mandible in as nearly a perpendicular position as possible to the base of the funnel, thus permitting a minimum of interference with the parts being taken. If canine and premolar teeth are particularly desired, the patient's nose should be pressed against the plate, while for molars, the nose should be slightly raised from the plate. The head

FIG. 5. POSITION FOR INTRAORAL FILMS.

clamp is now tightened, and the exposure made. This position and technique accomplish several things:

1. Each picture presents the small field with landmarks always in similar positions.
2. The thickness of the object and the distance always approximately the same, the time of exposure is the same.
3. Immobility is always accomplished.
4. Given the same distance and current, in a tube of known and equal penetration and intensity, a developer with known factor, and correct time of exposure maintained, the results will always be the same, i. e., the degree of density is that desired for this kind of work.

(b) *Films.*—For intraoral films the angle of the tube holder is reversed as

shown in Fig. 5, the patient's head being supported by an ordinary head rest attached to the back of the chair. We have not found it necessary to employ any sort of film holder other than the patient's thumb or finger.

INTERPRETATION OF FINDINGS

As a basis for roentgenologic diagnosis of pathological conditions about the teeth, it goes without saying that a thorough grounding in the *x*-ray appearance of the normal hard tissues and landmarks of the mouth is absolutely essential. Normal anatomical variations in the position and shape of the roots of the teeth, their relation to the floor of the maxillary sinus, the mental foramen, etc., must be fully understood.

FIG. 6. RAREFACTION DUE TO CHRONIC ABSCESS.

FIG. 7. RAREFACTION DUE TO GRANULATION TISSUE.

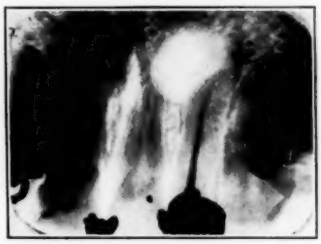


FIG. 8. RAREFACTION DUE TO APICAL DENTAL CYST.

In reporting roentgenologic findings of apical dental conditions it is as a rule justifiable only to state in any given case whether the condition shown is normal, probably normal, probably diseased, or definitely diseased. We are not warranted on roentgenologic findings alone in hazarding a diagnosis of the actual pathological condition present in the tissues hidden from view. Even with the aid of clinical examination, history, and symptoms, it is seldom that we can say definitely what the abnormal shadow represents. An area of lessened density around the apex of a tooth root permitting the rays to penetrate, means that bone alteration has taken place, but the picture does not tell us whether the cavity formed is an abscess containing pus, is filled with chronic inflammatory granulation tissue, or is a cyst. (Figs. 6, 7, 8.) It is even claimed that many of these roentgenographic areas of rarefaction in cases without symptoms simply show the results of previously existing disease, and do not denote an active process. In view of the almost constant histological and bacteriological demonstration postoperatively of disease in tissue removed from such areas, these statements should have but little weight, especially in patients suffering from systemic disease. Areas of apical disease of various sizes are sometimes quite apparent; at other times painstaking study, comparison, repetition of films, reference to history, chart, and clinical findings are necessary to form an opinion as to their presence. The size of an area of suspected abnormality bears no relation to its pathogenicity. Absence of an abnormal roentgenographic area does not necessarily mean that the tissue is nonpathologic. Interpretation must also be based upon something more than the mere pictures, e. g., a consideration of the response to the Faradic test, a knowledge of the root filling material employed, etc.

In addition to rarefaction as a result of infection the roentgenogram is frequently of great value in demonstrating the degree of destruction of the alveolar process from chronic suppurative pericementitis or pyorrhea alveolaris. This is shown in the early stages by a loss of the tips of the bony septa extending between the approximal surfaces of the teeth, and later by partial or complete destruction of the bone forming the tooth socket. (Fig. 9.)

FIG. 9. VARIOUS STAGES OF BONE ABSORPTION DUE TO PYORRHEA ALVEOLARIS.

SINUS EXAMINATION

In cases of systemic disease in which our routine examination reveals no foci of infection in the mouth, and especially when symptoms suggest the possibility of sinus disease, we consider a roentgenological examination of the nasal accessory sinuses to be indicated. This is carried out using the technique described by Waters and Waldron (*Amer. Jour. Roentgenology*, Feb. 1915), for which we find our stand well adapted. By carrying out the sinus examination as an extension of our routine, we have many times been rewarded by clearing up baffling diagnoses. (Fig. 10.)

REPORT OF FINDINGS

In Fig. 2 is shown a specimen of the data upon which we base a report of the results of our examination. At the top is a chart of the teeth with the result of the electric test. Below are shown the plates of the two sides, with films covering all dead and crowned teeth in the upper jaw. For the lower teeth the plates alone usually are sufficient. In this case our report to the physician in charge would read about as follows:

Upper Right.—Central incisor dead, apex diseased. First bicuspid crowned, apex normal. Second bicuspid dead, partial root filling, apex normal.

Upper Left.—Lateral incisor crowned, partial root filling, apex normal. Cuspid dead, apex probably normal.

Lower Left.—Second bicuspid dead, apex normal. First molar crowned, no root fillings, apices normal. Third molar impacted. If pyorrhea is found we report as to its extent and stage, and whether microscopic examination shows Endamœba gingivalis.

If desired we also give our recommendations as to treatment. (The illustration has had to be reduced so much that the conditions described are not well shown, and is merely used as an example of the record of a complete examination.)

RELATIONS TOWARD PATIENT, PHYSICIAN, AND DENTIST

The relations of the roentgenological consultant in these cases toward the patient, the physician, and the dentist require some discussion, as difficulties arise in this respect from time to time. In a case referred by a physician for elimination of foci of mouth infection, what shall be our attitude toward the patient and the patient's dentist in regard to possession of roentgenograms, etc? Our position in a case of this kind may be expressed as follows: The patient is referred by the physician not merely for the taking of *x*-ray pictures, but comes for a consultation as to the location of foci of infection in the mouth. During our examination we employ the *x*-ray as *one* of the

FIG. 10. PUS IN LEFT MAXILLARY SINUS.

Patient had pain referred to upper left first premolar tooth, examination of which was negative. Extension of our examination showed the sinus trouble.

methods that enable us to make a diagnosis. Any plates and films made incidentally during the examination therefore form part of our record of the case and are our property, just as clinical charts, microscopical preparations, etc., are the property of the physician or the pathologist. The thing for which the patient is paying the fee is not the pictures but the professional opinion, which his physician gets in the form of a detailed report. A demand by the patient for possession of roentgenograms with a view to obtaining the opinion of others who may be competent or incompetent in interpretation, if concurred in,may result and has frequently resulted in grave injustice to the roentgenologist, especially after he has given a detailed report in writing. Moreover, many conflicting opinions are not to the best interests of the patient. There can be no objection, however, to submitting the plates and films for examination to any one authorized by the physician referring the case. In accepting a case for examination, where we are expected to furnish a report, we have been compelled first to have an understanding with the patient as to our position in this matter. This brings us to a consideration of our relations to the patient's dentist. We are fully aware of the delicate situation in which we are placed when forced in the case of a patient referred by a physician to pass upon the work of his dentist. The necessity of an impartial report of conditions found is of supreme importance, and consideration for the patient's general health must take precedence over the niceties of professional etiquette. At the same time, an invitation to the dentist to examine the plates and films with us and a frank interchange of views will generally clear up a somewhat difficult situation. When a dentist refers a patient to us himself for roentgenograms, we do not ordinarily furnish any report of the findings, but deliver the plates and films into his possession for his own interpretation. As this type of examination becomes more common, and dentists in general become more familiar with the interpretation of roentgenograms, the difficulties mentioned above will largely disappear.

DEPARTMENT OF LABORATORY NOTES

EDITOR, DAVID R. BOWEN, M.D., PHILADELPHIA, PA.

COOLIDGE TUBE BONE TECHNIQUE

BY F. H. KUEGLE, M.D., NICHOLAS SENN HOSPITAL, OMAHA, NEBR.

DURING the past year, we have done a large amount of experimental work with a fine focus Coolidge tube in an effort to develop a satisfactory bone technique. We have finally adopted a method modeled after one used by Dr. August Schonfeld of the Kaiser-Jaubilaums Hospital of Vienna, whose radiograms are of a very high grade and of uniformily good quality.

The technique here described differs from others in that a very low milliamperage and penetration with a correspondingly long exposure, depending upon the thickness of the part being radiographed, are used. This insures a maximum of bone detail and contrast not to be obtained by high milliamperage and penetration. The method, to be sure, has its limitations as it is not applicable for radiographing movable parts such as the thoracic vertebræ or for very young children who will not remain quiet during the exposure.

The details of the technique consist in selecting that button of the rheostat which will give a milliamperage varying between 9 and 11, when the filament temperature is adjusted to back up a spark of 3½ to 4½ inches.

By slightly changing the filament temperature one can readily secure the desired penetration for any part. For example for an elbow or knee, 11 milliamperes and a back-up spark of 3½ to 3¾ inches; for a shoulder 10 milliamperes and a back-up spark of 4 inches; for a heavy hip or head 9 milliamperes and a 4½-inch back-up spark.

The rheostat button which will comply to the above requirements will vary with different transformers, but once the proper selection has been made, all trouble ceases as one needs only to place the rheostat control on, say button 7, adjust the filament temperature to give 9, 10 or 11 milliamperes, measure the part, refer to the table appended for the time and make the exposure.

We make all our exposures at a uniform distance of 60 cm. The following table gives the required exposure for the three kinds of plates we have used.

Thickness of Part	Paragon Plate	Seed Plate	Cramer Plate	Screen
1 Cm.	1½ Sec.	2 Sec.	2½ Sec.	
2 "	2 "	3 "	4 "	
3 "	3 "	4 "	5 "	
4 "	4 "	5 "	6 "	
5 "	5 "	6 "	8 "	
6 "	6 "	7 "	9 "	
7 "	7 "	8 "	10 "	
8 "	8 "	9 "	11 "	2 Sec.
9 "	9 "	10 "	12 "	2½ "
10 "	10 "	11 "	14 "	3 "
11 "	12 "	13 "	16 "	3½ "
12 "	13 "	15 "	17 "	4 "
13 "	14 "	16 "	19 "	5 "
14 "	16 "	17 "	21 "	5½ "
15 "	17 "	19 "	22 "	7 "
16 "	18 "	21 "	23 "	9 "
17 "	20 "	23 "	25 "	10 "
18 "	22 "	25 "	27 "	11 "
19 "	24 "	27 "	29 "	12 "
20 "	26 "	29 "	31 "	13 "

A STATEMENT REGARDING THE METAL ENVELOPE PLATE CHANGER

AT the Richmond meeting of the A. R. R. S. I read a paper describing several devices, among them a metal (aluminum and brass) envelope for changing stereoscopic plates in certain difficult positions. The paper, through neglect of the writer, was not published but this "envelope" has received some commercial and literary at-

tention, in all of which due credit has been given.

I am prompted to bring the matter to notice now, having had my attention called to a cataloged modification. With due deference to the courtesy extended in the coupling of my name with this later design, I must express the opinion that this really admirable apparatus is not a modification of my "envelope" but of an earlier type of metal plate-changer, in the designing of which I had no part.

The essential feature of the "envelope" is its thinness and its perfectly smooth, rounded edges and corners. Its chief utility comes from the ease with which it can be worked between the sheet and mackintosh of a fracture bed, underneath a fractured hip or spine with little or no disturbance of position. (A liberal dash of talcum ahead of it helps wonderfully.)

The fact that this, which to me is its most important feature, is quite impossible with the "modification" forms my only excuse for calling attention to it here.

D. R. B.

THE ELIMINATION OF HYPO FROM NEGATIVES

BY H. A. STEVENSON, M.D., LONDON, ONT.

OF all the processes in plate finishing that of washing out the hyposulphite of soda consumes the most time, and in many instances any method which will shorten this time is valuable. I have used the following process for a very long time with ordinary photo work and it works equally well with *x*-ray plates.

After the plates have been properly fixed they are taken from the hypo bath and rinsed, for a minute or so, in running water and then are placed for five minutes in a solution which is made up as follows:

Hydrogen peroxide (10 vol. solution)	2 drams
Water	5 ounces

The plates are then rinsed under the tap and placed in the rack to dry. The peroxide converts the hypo into a trisulphite which is more stable and is much more soluble in water.

The plates will keep indefinitely without turning brown as do improperly washed plates. A stronger peroxide solution does no harm.

IMMEDIATE STEREOSCOPY

FOR the past six or seven years we have practiced daily the examination of stereoscopic roentgenograms without an instrument, by the simple expedient of "crossing the eyes." The idea is not original, but we are quite unable to say who called our attention to it. Having seen it in frequent use by others, it has only recently occurred to us that it is really not commonly known and that it seems never to have been reported.

We presume that every one possessing bifocal vision has the ability to look "cross-eyed" at a single object and see it double, but perhaps very few are aware that if two exactly similar objects, as for instance two nails standing upright in a board, are thus viewed, one sees not four nails but three, the middle one being distinctly plainer than the other two. If, now, instead of nails we use a stereoscopic pair of roentgenograms we see again not four but three; and if the mind is concentrated upon the middle one of the three images, it will be found to be stereoscopic.

Having once achieved stereoscopic vision in this way it becomes entirely a matter of practice and, as in many other physical

accomplishments, swimming, bicycling, and the like, practice gives facility. We fancy that not a few have partially acquired the art and have been sufficiently alarmed at the noticeable muscle fatigue to discontinue the practice. We are persuaded that this is a needless caution and that, with a very few exceptions in individuals affected with real muscular insufficiency, the fatigue will not be noticed after the first few trials.

If, now, we examine the phenomenon more closely we find that, as we stand before the stereoscopic pair and view them by this method, we really see the plate at our left hand with our right eye, and vice versa.

By any other method, as the prism stereoscope of Edwards, the tubular type of Pirie, or the reflecting (Wheatstone) type, we see the left-hand plate with the left eye. It follows that, having a pair of chest plates so arranged that, viewed by this immediate method, the posterior aspect of the chest presents; then, by any of the instrumental methods, the same plates will present the anterior aspect; and to see the posterior aspect instrumentally the plates must be reversed, left becoming right, etc. The advantage of immediate stereoscopy is that one always has his eyes with him and very satisfactory stereoscopic vision is possible at places and times where the presence of an instrument is not practical.

The limitation is largely that of very close examination, as in the mastoid, etc., etc. To examine such plates closely calls for a greater divergence which may, to some at least, doubtless mean unavoidable fatigue. On the other hand, in the examination of chest plates, at a distance of several feet or yards, effects may be had by the immediate method which are not possible with any instrument.

The only reference to any similar method which we have seen in the literature is that of Girsdansky,[1] who describes a card with a rectangular slit, held before the eyes in such a position that each eye can see only one plate. The mechanism is substantially the same as in the immediate method here described, this rectangular slit being held at just the point where the separated lines of vision cross. We have found Girsdansky's method possible, but not easy. The distance of the card from the eyes must, of course, be varied by two factors: the size of the stereoscopic pair and their distance from the eyes.

Girsdansky's studies were so painstaking that it is to us surprising that they were concluded without, apparently, recognizing the desirability of convergent stereoscopic vision without the aid of the cardboard window, with which he concluded.

For beginners we recommend that the pair be placed about one inch apart, and not in close relation with other plates. It is, in fact, preferable that all surrounding light be blocked off; but it is rather surprising how soon one becomes able to disregard all surroundings and to look at the pair with the same lack of conscious effort that rules in ordinary vision.

We have frequently, in teaching this method, also made use of some small object, as for instance a hat pin, placed at a distance of twelve or fourteen inches from the eyes. To first fix the vision upon this object, and then gradually withdraw it, is sometimes an aid in securing the crossed vision.

For the reasons already given, positives from ordinary photographs cannot be viewed in this way if they have been mounted for the hand stereoscope, because each eye sees the wrong side of the print and a pseudo-stereoscopic effect is produced. Positives from stereoscopic roentgenograms are readily viewed but the image is, of course, reversed as to posterior and anterior by shifting the position of the positives, as in the instance of the chest given above.

D. R. B.

[1] M. Girsdansky, *N. Y. Med. Jour.* Vol. xciii (1911), p. 64; and vol. xciv (1911), pp. 82 and 1092.

DEPARTMENT OF TRANSLATIONS AND ABSTRACTS

EDITOR, JAMES T. CASE, M.D, BATTLE CREEK, MICH.

SCHOWNFELD and FRIEDL: Two Cases of Double Kidneys, One Complicated by Hydronephrosis. (*Fortschr. a. d. Geb. d. Röntgenstrahlen,* Vol. XXIII, No. 2.)

Roentgen literature contains but few cases of complete double kidneys. Our work with collargol injection of the renal pelves has shown that there is no risk or danger to the pathological kidney. We have also come to the conclusion that there is no danger to the normal kidney in carefully made injections if it be stopped at the moment the patient feels the slightest fullness or pain in the region. Pyelography gives evidence of pathological change in pelvis and parenchyma before operation.

Two instructive cases of complete double kidney and ureter are reported. The second case is complicated by hydronephrosis in the lower kidney. No similar case has been reported. The especial interest lies in the value of determining the exact condition found later on operation.

Cystoscopic examination revealed two ureteral openings on one side. The patient was given cathartics and irrigations and placed on a bland diet for two days, after which time he was again cystoscoped, a homogeneous lead catheter being inserted in one ureter, and in the other a graduated bismuth catheter. The roentgenogram showed two ureters, neither one of which crossed or approached the other. One kidney pelvis was found at a higher level than the other. Thirty cubic centimeters of a five per cent. collargol solution was injected into this lead catheter, the roentgenogram of which showed a normal pelvis. The solution was then withdrawn and four cubic centimeters of the solution injected into the bismuth catheter. No communication between the two pelves was noted. The lower kidney was seen to be about five times as large as the upper one.

The second case was found on cystoscopic examination to be similar to the first, except that from one of the openings a normal secretion was passed while from the other a cloudy fluid emerged. Pyelography was indicated and undertaken, two different kinds of ureteral catheters being used as in the preceding case. The bismuth catheter was inserted into the opening nearest the median line and the roentgenogram showed the course of the ureter to be approximately normal. The lead catheter, inserted into the lateral opening passed upwards and outwards in a wide curve not much higher than the iliac crest. Into the bismuth catheter was injected eighteen cubic centimeters of a five per cent. collargol solution, the pelvic outline indicating a normal kidney in about the usual location. Collargol injection into the lead catheter indicated a hydronephrosis, seventy cubic centimeters of the solution being required to fill the pelvis. The roentgenogram showed a decidedly abnormal configuration and an exceptionally large area of collargol shadow. This was later confirmed by operation when the diseased kidney was extirpated.

E. S. B.

RANSOHOFF, JOSEPH and J. LOUIS: Radium Treatment of Uterine Fibroids. (*Lancet Clinic,* CXV, No. 6, Feb. 9, 1916, p. 116.)

While in Germany and France the radium and *x*-ray treatment has steadily grown in popularity, the adoption of this treatment in America has been very tardy. In advocating the radium treatment of uterine fibroids in this country, the authors hold that the independence of uterine hemorrhage from ovarian function is amply demonstrated (1) by the futility of double ovariotomy in these cases—an operation formerly popular and now fortunately obsolete; (2) by the continued growth of fibroids after the menopause; (3) by the decrease in size of the uterus by radium and *x*-ray treatment after the passing of the menopause.

The technique is described as follows: Radium is introduced into the uterus in doses

The Abstract Editor is indebted to the *Zentralblatt für Röntgenstrahlen, Radium und verwandte Gebiete* for material aid in the production of abstracts of many of the foreign articles.

varying from 50 to 100 mg., enclosed in pure rubber tissue to prevent secondary burning effects. As a rule, no further filter than the ½ mm. silver tube in which the radium is contained is necessary, but when it is desirable to leave the radium in place for a very long time, an additional filter of ½ mm. brass is used. Preliminary curettage is unnecessary as a rule. The cervix is thoroughly dilated under an anesthetic in order to allow of large radium containers being introduced. The radium is left in place from 6 to 24 hours, depending upon the size of the tumor and the severity of the hemorrhage. If necessary, treatment is repeated two or three times at intervals of two weeks. In fibroids of very large size, more frequent applications are necessary.

The authors arrive at the following conclusions: Except in unusual cases, radium or *x*-ray should be the treatment of choice in uterine fibroids and in essential uterine hemorrhages. Among the cases unfitted for radium therapy are the very indurated fibroids in women of advanced years where the blood supply is usually scant. Radium has certain advantages over the *x*-ray: (1) It has a direct action on the uterus; (2) there is no risk of deleterious action on the skin; (3) it is more likely to decrease the size of the tumor, often causing its complete disappearance; (4) in certain cases of menorrhagia, accurate dosage will control hemorrhage without bringing on the menopause.

KUEPFERLE and BACMEISTER: Roentgenological Experiments in the Treatment of Tuberculosis. (*Deutsche med. Wchnsch.*, Vol. 42, No. 4, Jan. 27, 1916.)

Based upon the favorable results of experiments on rabbits, the authors have adopted roentgentherapy in the treatment of human tuberculosis in the Freiburg Medical Clinic and in the Sanatorium for Tuberculosis at St. Blasien. The results of these animal experiments are summarized as follows:

(1) After experimental inoculation of rabbits with tubercle bacilli the outbreak of the disease was prevented by the application of hard, filtered rays. The affection, when already present, was cured by the same means.

(2) The roentgen rays impinge upon the tuberculous granulation tissue which grows at a comparatively rapid rate, transforming the same into cicatricial tissue. The roentgen rays have no effect upon the tubercle bacilli themselves.

(3) To effect a cure, an optimum dose is necessary. Small doses at long intervals are useless. Very large doses in rapid succession, without observing intervals of sufficient length for the reaction, damage the normal lung tissue, producing bronchitis and bronchopneumonia.

(4) It is necessary to administer sufficiently large quantities of energy (in the animal experiments 20 to 23X superficial energy) in from 3 to 5 days with observance of adequate intervals, in order to induce and accelerate the curative process.

(5) A roentgen cure may be effected with correct technique in experimentally induced hematogenous and aspiration tuberculosis.

(6) The light of quartz lamps has no direct influence upon experimental pulmonary tuberculosis.

FLEINER, WILHELM: Situs Viscerum inversus abdominalis, Displacement of Stomach and Dilatation of Esophagus. (*Muench. med. Wchnsch.*, Vol. 63, No. 4, Jan. 25, 1916, p. 113.)

The patient, a married lady of 27, had been vomiting from childhood. There was pressure in the pit of the stomach rising up to the throat and causing retching and burning, until vomiting set in. Then the complaint disappeared. Appetite and stool always regular. The patient was admitted after her family physician and a gastro-enterological specialist had made a diagnosis of hourglass stomach with constriction of the gastric outlet, advising gastro-enterostomy.

The clinical examination showed certain anatomical irregularities, but not sufficient to account for the condition. In conjunction with the roentgen examination it was possible to completely elucidate the condition. The stomach was displaced upward and to the right. Consequently, the esophagus turned a sharp angle in the same direction, giving rise to a dilatation caused by the stagnation due to the kink. The abdominal viscera were inversely displaced.

Operation would not only have been dan-

DEPARTMENT OF TRANSLATIONS AND ABSTRACTS

EDITOR, JAMES T. CASE, M.D, BATTLE CREEK, MICH.

SCHOWNFELD and FRIEDL: Two Cases of Double Kidneys, One Complicated by Hydronephrosis. (*Fortschr. a. d. Geb. d. Röntgenstrahlen,* Vol. XXIII, No. 2.)

Roentgen literature contains but few cases of complete double kidneys. Our work with collargol injection of the renal pelves has shown that there is no risk or danger to the pathological kidney. We have also come to the conclusion that there is no danger to the normal kidney in carefully made injections if it be stopped at the moment the patient feels the slightest fullness or pain in the region. Pyelography gives evidence of pathological change in pelvis and parenchyma before operation.

Two instructive cases of complete double kidney and ureter are reported. The second case is complicated by hydronephrosis in the lower kidney. No similar case has been reported. The especial interest lies in the value of determining the exact condition found later on operation.

Cystoscopic examination revealed two ureteral openings on one side. The patient was given cathartics and irrigations and placed on a bland diet for two days, after which time he was again cystoscoped, a homogeneous lead catheter being inserted in one ureter, and in the other a graduated bismuth catheter. The roentgenogram showed two ureters, neither one of which crossed or approached the other. One kidney pelvis was found at a higher level than the other. Thirty cubic centimeters of a five per cent. collargol solution was injected into this lead catheter, the roentgenogram of which showed a normal pelvis. The solution was then withdrawn and four cubic centimeters of the solution injected into the bismuth catheter. No communication between the two pelves was noted. The lower kidney was seen to be about five times as large as the upper one.

The second case was found on cystoscopic examination to be similar to the first, except that from one of the openings a normal secretion was passed while from the other a cloudy fluid emerged. Pyelography was indicated and undertaken, two different kinds of ureteral catheters being used as in the preceding case. The bismuth catheter was inserted into the opening nearest the median line and the roentgenogram showed the course of the ureter to be approximately normal. The lead catheter, inserted into the lateral opening passed upwards and outwards in a wide curve not much higher than the iliac crest. Into the bismuth catheter was injected eighteen cubic centimeters of a five per cent. collargol solution, the pelvic outline indicating a normal kidney in about the usual location. Collargol injection into the lead catheter indicated a hydronephrosis, seventy cubic centimeters of the solution being required to fill the pelvis. The roentgenogram showed a decidedly abnormal configuration and an exceptionally large area of collargol shadow. This was later confirmed by operation when the diseased kidney was extirpated.

E. S. B.

RANSOHOFF, JOSEPH and J. LOUIS: Radium Treatment of Uterine Fibroids. (*Lancet Clinic,* CXV, No. 6, Feb. 9, 1916, p. 116.)

While in Germany and France the radium and *x*-ray treatment has steadily grown in popularity, the adoption of this treatment in America has been very tardy. In advocating the radium treatment of uterine fibroids in this country, the authors hold that the independence of uterine hemorrhage from ovarian function is amply demonstrated (1) by the futility of double ovariotomy in these cases—an operation formerly popular and now fortunately obsolete; (2) by the continued growth of fibroids after the menopause; (3) by the decrease in size of the uterus by radium and *x*-ray treatment after the passing of the menopause.

The technique is described as follows: Radium is introduced into the uterus in doses

The Abstract Editor is indebted to the *Zentralblatt für Röntgenstrahlen, Radium und verwandte Gebiete* for material aid in the production of abstracts of many of the foreign articles.

varying from 50 to 100 mg., enclosed in pure rubber tissue to prevent secondary burning effects. As a rule, no further filter than the ½ mm. silver tube in which the radium is contained is necessary, but when it is desirable to leave the radium in place for a very long time, an additional filter of ½ mm. brass is used. Preliminary curettage is unnecessary as a rule. The cervix is thoroughly dilated under an anesthetic in order to allow of large radium containers being introduced. The radium is left in place from 6 to 24 hours, depending upon the size of the tumor and the severity of the hemorrhage. If necessary, treatment is repeated two or three times at intervals of two weeks. In fibroids of very large size, more frequent applications are necessary.

The authors arrive at the following conclusions: Except in unusual cases, radium or *x*-ray should be the treatment of choice in uterine fibroids and in essential uterine hemorrhages. Among the cases unfitted for radium therapy are the very indurated fibroids in women of advanced years where the blood supply is usually scant. Radium has certain advantages over the *x*-ray: (1) It has a direct action on the uterus; (2) there is no risk of deleterious action on the skin; (3) it is more likely to decrease the size of the tumor, often causing its complete disappearance; (4) in certain cases of menorrhagia, accurate dosage will control hemorrhage without bringing on the menopause.

KUEPFERLE and BACMEISTER: Roentgenological Experiments in the Treatment of Tuberculosis. (*Deutsche med. Wchnsch.*, Vol. 42, No. 4, Jan. 27, 1916.)

Based upon the favorable results of experiments on rabbits, the authors have adopted roentgentherapy in the treatment of human tuberculosis in the Freiburg Medical Clinic and in the Sanatorium for Tuberculosis at St. Blasien. The results of these animal experiments are summarized as follows:

(1) After experimental inoculation of rabbits with tubercle bacilli the outbreak of the disease was prevented by the application of hard, filtered rays. The affection, when already present, was cured by the same means.

(2) The roentgen rays impinge upon the tuberculous granulation tissue which grows at a comparatively rapid rate, transforming the same into cicatricial tissue. The roentgen rays have no effect upon the tubercle bacilli themselves.

(3) To effect a cure, an optimum dose is necessary. Small doses at long intervals are useless. Very large doses in rapid succession, without observing intervals of sufficient length for the reaction, damage the normal lung tissue, producing bronchitis and bronchopneumonia.

(4) It is necessary to administer sufficiently large quantities of energy (in the animal experiments 20 to 23X superficial energy) in from 3 to 5 days with observance of adequate intervals, in order to induce and accelerate the curative process.

(5) A roentgen cure may be effected with correct technique in experimentally induced hematogenous and aspiration tuberculosis.

(6) The light of quartz lamps has no direct influence upon experimental pulmonary tuberculosis.

FLEINER, WILHELM: Situs Viscerum inversus abdominalis, Displacement of Stomach and Dilatation of Esophagus. (*Muench. med. Wchnsch.*, Vol. 63, No. 4, Jan. 25, 1916, p. 113.)

The patient, a married lady of 27, had been vomiting from childhood. There was pressure in the pit of the stomach rising up to the throat and causing retching and burning, until vomiting set in. Then the complaint disappeared. Appetite and stool always regular. The patient was admitted after her family physician and a gastro-enterological specialist had made a diagnosis of hourglass stomach with constriction of the gastric outlet, advising gastro-enterostomy.

The clinical examination showed certain anatomical irregularities, but not sufficient to account for the condition. In conjunction with the roentgen examination it was possible to completely elucidate the condition. The stomach was displaced upward and to the right. Consequently, the esophagus turned a sharp angle in the same direction, giving rise to a dilatation caused by the stagnation due to the kink. The abdominal viscera were inversely displaced.

Operation would not only have been dan-

gerous, but probably perfectly useless, and was therefore contraindicated. As there was no other serious complaint, the prescribed treatment was simply a dietary one, coupled with instructions to have the esophagus evacuated every evening by means of a soft stomach tube or, better still, to have it washed out on the principle of gastric lavage.

LASSER, K.: Induction of Roentgen Rays with a New Gas-Free Tube and a Special Apparatus. (Meeting of the United Medical Societies, Berlin, Jan. 26, 1916. Reported in *Muench. med. Wchnsch.*, Vol. 63, No. 7, Feb. 7, 1916, p. 239.)

When in a completely evacuated roentgen tube the application of a thermo-electrode has rendered the induction of roentgen rays possible, the result will consist in thermoions instead of impulse ions in a partly evacuated tube. This thermoionization can be excellently controlled, its quantity being only dependent upon the temperature applied. Roentgen rays are already induced at 2,000° C., the optimum being at 2,800°. These temperatures are applicable with tungsten electrodes, their melting point being at 3,000°. It is on this system that Wehnelt, Lilienfeld, Fürstenau and Coolidge have constructed their tubes. Coolidge, for instance, heats a tungsten cathode. These tubes, however, did not attain to any practical significance on account of their inherent faults. Siemens & Halske made the anticathode more substantial and increased its resistance by raising its heating capacity. The tension applied to the apparatus varies between 26,000 and 80,000 volts, which are under perfect control. So is the heat current for the electrodes by connecting or disconnecting resistances.

In this way it is possible to maintain equal hardness of the tubes with any potential, the heat current being under control. Thus it is quite impossible to have photographic failures. Beginners can at once make technically perfect exposures.

Another advantage is that alternating currents may be brough direct to the tube.

The control of the tube may be exercised in two ways: by regulation of the current supply or by connection of a resistance. The latter method had to be followed with the old tubes, while the new method is more advantageous. The alternating current which is sent through a Graetz arrangement of valve tubes, arrives in the new tube as a pulsating direct current.

According to tension, a large part of soft or hard rays leaves the roentgen tube. With the new tube, the induction of homogeneous rays is perfectly possible, which is a matter of importance.

LUDEWIG, P.: Problems of Instantaneous Roentgenography. (*Helios.*, Vol. 21, 1915, p. 517.)

The necessity of making an instantaneous exposure with thick lead plates which are most unsuitable for rapid manipulation, and the ease with which flash exposures can be made, have combined to give the exclusive preference to the latter in roentgen technique. Ludewig has examined the possibilities and difficulties of flash exposures and distinguishes between rapid and time exposures. Rapid or short exposures are indicated when the time has to be shortened as for instance in unruly patients (children). These are not instantaneous exposures, it being impossible to obtain pictures of rapidly moving organs (heart, etc.) by means of them. To carry out this method, a time relay has been connected with the primary current of the inductor or high tension equalizer, on the dial of which any desired break of the current may be effected.

In these rapid exposures there is the difficulty to be reckoned with that the anticathode focus of the roentgen tube becomes very hot in the short exposure, which would easily damage the tube. This drawback is increased in instantaneous exposures, in which a short but very intense current impulse passes through the roentgen tube by a single interruption of the primary current. Tungsten (with a melting point of about 3,000°) has been successfully used as anticathode material.

The roentgen energy produced in this short time is so small that it will not sufficiently darken the plate. To overcome this difficulty, roentgen tubes of Lindemann glass have been used which is far more permeable to roentgen rays than the ordinary kinds of glass, combined with the intensifying screen. The fluorescent side of the latter is placed on the active side of the photographic plate, which serves to

intensify the darkening of the plate at the places impinged upon by the roentgen rays.

Another difficulty consists in the accurate timing of the exposure to obtain a good picture, and this depends upon using the right degree of hardness, a special degree being necessary for each exposure. In time exposures a suitable tube may be selected by a preliminary test. In instantaneous exposures, however, a tube can not be selected under working conditions which will obtain later on at the actual exposure. Since the degree of hardness of the tube very materially depends upon the primary current, and since the degree of hardness is often changed by leaps and bounds especially when the current is changed, an exact determination of the hardness of the tube at the exact moment of the exposure is exceedingly difficult. When the tube is too hard, the plate will be blurred even with a correctly timed exposure, while a soft tube will produce an underexposed picture.

The instantaneous process may be technically carried out in various ways. It is necessary to rapidly increase the primary current of the inductor and as rapidly break it. A transformer can not be used for this purpose for reasons connected with its magnetic behavior. In the first experiments a metal rod was pulled out of a mercury surface, and a tolerably serviceable method of spark extinguishing was attempted by means of oil. But as the interrupting spark could not be eliminated rapidly enough, and yet the length of the instantaneous exposure is dependent upon the rapidity of the interruption, the acceleration of the latter was attempted in a different way. This was effected by cutting through a wire connected with the primary current by means of a shot, or by inserting a melting cartridge in the primary current which melted in an explosion at a certain current strength after closing and swelling of the primary current. Another method is based on commutation of the primary current.

Of particular interest for instantaneous photography are the electric oscillations which are caused at the moment of the induction impulse. By their occurrence, the duration of the flash may sometimes be very materially prolonged. Oscillations may occur by a condenser being connected parallel to the point of interruption of the primary current. This should be absolutely avoided in instantaneous work. But oscillations may also occur in the secondary current without the primary condenser. They are due to the fact that every coil has a capacity and induction of its own according to length. Instead of the solitary short current impulse which is intended, oscillations will be found in the oscillogram of the secondary current, the length of which is in proportion to the auto-induction and capacity of the secondary coil (Spule). Photographing the roentgen light that emanates from a roentgen tube at a single interruption, will produce on a rapidly moving photographic plate stripes separated from each other by unexposed interstices. It is perfectly clear that, in the instantaneous roentgen process, these oscillations should be suppressed, because they may tend to considerably prolong the duration of the secondary current. Old inductors with slow secondary oscillation are therefore unsuitable, and it is advisable to arrange the dimensions of the secondary coils (Spulen) so that the oscillations disappear very rapidly. For this purpose they should consist of very few windings. But as these oscillations can never be entirely avoided, it follows that there is a limit to the rapidity of the exposure by the indicated method.

These reflections are of great importance, as the understanding of many results reported in the technical roentgen literature are dependent upon them. Thus, for instance, in regard to the duration of instantaneous exposures, there are the most contradictory statements and acrimonious discussions without pointing by a single word to the salient point—the speed of the secondary oscillations. It is necessary, therefore, in all statements regarding the duration of exposures, to mention the exact details of all the switching arrangements of the installation.

ISELIN, HANS: Roentgen Examination of the Shoulder in Two Directions at Right Angles. (*Beitr. z. klin. Chir.*, Vol. 97, No. 4, p. 473.)

The author has worked out a method of roentgen examination of the shoulder in the frontal and sagittal directions. As to the vertical exposures, the one from the axilla has proved more serviceable than that from above. In the exposure from below, the arm rests

horizontally on some support and the tube is underneath. The distance from the axillary dome is about 40 cm., the plate lies on top of the shoulder and may be held in position by an assistant or a plateholder by which the head of the tube is kept parallel to the plate. Two illustrations show that by such an arrangement a displacement of the fracture may be discovered which was not visible from the front.

Of particular value was the exposure from the axilla to determine the position of a shrapnel shot which, according to the anterior exposure, seemed to lie in the shoulder joint, but could not be found there. The exposure from below ascertained that it was located below the acromial arch in the space of the musculus supraspinatus. Here it was found and removed.

Iselin takes this occasion to show how the position of a foreign body may be easily and safely determined and read off by means of two pictures at right angles to each other. The plates are placed vertically on each other with their long edges, so that the foreign body lies in a plane vertical to one of the plates. By constructing vertical lines from the foreign bodies in the pictures, the intersecting point of the two straight lines will indicate the position of the bullet, etc., in accordance with the rules of geometry.

SCHUETZE, JOHANNES: New Indications for the Use of Intensifying Screens. (*Fortsch. a. d. Geb. d. Roentgenst.*, Vol. XXIII, No. 5, Jan. 11, 1916, p. 425.)

Immelmann's Institute now uses the intensifying screen almost exclusively for the roentgen demonstration of the uropoietic system, and Schuetze, in explaining the reasons and technique adopted, does not doubt that the advantages of this method will induce numerous other roentgenologists to do likewise.

The objectional graining is overcome by substituting a celluloid leaf ("Celluloidfolie"), which is absolutely grainless. The tube must be very soft and capable of standing a very powerful secondary current for a long time. The exposure is made with arrested breath at expiration with the compression diaphragm. (Extra strong tubes of 3-4 Walter at 5 M. A. secondary current, with "Eresco" equalizer, 25-26 M. A. during exposure, time of exposure 10 seconds; or at 46 M. A. 3 to 4 seconds.) The advantages are:

(1) The shortened exposure allows of radioscopy during arrest of respiration.

(2) The softness of the tube promotes rich contrasts.

(3) Control or repeated exposures can be made with impunity at short intervals owing to the shortened exposures and the smaller amount of applied roentgen energy.

(4) Economy in plates and tubes.

Conditions are similar in the roentgen examination of the thoracic viscera, especially the lungs. The diagnosis is considerably facilitated, the minutest changes being visible. High tension equalizer, focal distance 70 cm., 3-4 Walter at 5 M. A., exposure 45 M. A., 1-2 seconds.

The method has also proved superior in the exposure of cranial contents (cysts, tumors, slight lime deposits) where contrasts are of importance. Tubes of 4-5 Walter, 5 M. A. secondary, potential 20 M. A. 15 seconds for sagittal and 10 seconds for frontal exposure.

Exceptionally good results have been obtained with the intensifying screen and the so-called front or ray exit diaphragm in the demonstration of gallstones. Using Holzknecht's compression diaphragm as a frontal diaphragm for direct radioscopy, the approximate position of the gallstones is ascertained; also the possible coincidence of pain points and stone shadows, and their displaceability at respiration. Henzelmann's "Exponator" has also done valuable service in the place of Holzknecht's apparatus. The author and Rubaschow (*Fortschritte*, Vol. XXI) have worked out the following technique:

Ventral position with the upper part of the body elevated. The plate (18 x 24 cm.) is pressed into the abdomen slightly exceeding the midline to the left, the center of the plate being about two fingers' width below the anterior right costal arch. The diameter of the cylinder diaphragm should not exceed 10 cm. Placed obliquely and snugly on the back, it should just include the twelfth rib. The exposure is made with very soft rays during arrest of respiration. Intensifying screen with celluloid leaf. 3-4 Walter at 5 M. A.; high tension equalizer; 26-28 M. A. for 10 seconds or 46 M. A. for 5 seconds. Only few gallstone exposures can be

reproduced, and they must be studied on the original plates.

The article is accompanied by eight illustrations, showing 3 renal exposures, 1 disseminated miliary tuberculosis, 2 cranial exposures, 1 gallstone, 1 cholesterin stone.

RIEDER, PROF. H.: Roentgen Examination of Birds' Eggs in the State of Incubation. (*Fortsch. a. d. Geb. d. Roentgenst.*, Vol. 23, No. 5, Jan. 11, 1916, p. 441.)

Eggs, in spite of the lime contained in their shells, can be roentgenologically examined. The experiments were made with pigeons', hens', turkeys' and ducks' eggs, the results being similar in all cases.

In the unincubated state the eggs show roentgenologically nothing but the air space, while with transmitted, harsh, artificial or natural light the white can be distinguished from the yolk. With a medium tube, parallel spark gap of 8 cm., focal distance about 40 cm. and about three seconds' exposure, good pictures were obtained. In eggs undergoing natural hatching, the various parts can be distinctly seen: the large air chamber, the huddled body, the protruding skull or the bones composing the same, the long vertebral column, the ribs, the wings, the legs with their strongly developed thighs and spread toes. Beak and pelvis can not always be seen distinctly. With artificial incubation lasting twenty-three days, the following observations were made:

On the first day there is a distinct air space at the blunt end of the egg which increases in size until at the end of the incubation it occupies about one-third of the total space. On the 12th or 13th day a few indistinct lime particles are observed. On the 14th or 15th day, the tubular bones of the extremities are distinctly recognizable. On the 17th day the exact position of the embryo can be seen, the head lying laterally to the chest and the legs being drawn up against the chest. The vertebral column and, in fact, the entire skeleton can be differentiated. The curvature of the vertebral column is at times at the blunt end and at other times at the pointed end of the egg. When candling eggs for their freshness, the embryo may be observed as early as the sixth day, but under the roentgen rays the calcareous bones can not be seen before the twelfth or thirteenth day, when there is already a strong movement discernible. After the chicken has been hatched, all the above skeletal parts can be recognized.

The observations are probably not of any practical value, but sufficiently interesting to be communicated.

SPENCER, WILLIAM H., MEYER, GEORGE P., REHFUSS, MARTIN E., and HAWK, PHILIP B.: Gastro-intestinal Studies. XII. Direct Evidence of Duodenal Regurgitation and Its Influence upon the Chemistry and Function of the Normal Human Stomach. (*The Am. Jour. of Physiol.*, XXXIX, No. 4, Feb. 1, 1916, p. 459.)

In the course of extensive investigations in the Laboratory of Physiological Chemistry of the Jefferson Medical College, the authors found that the color of gastric material differed from that of the substances introduced and attributed this change to the presence of bile. This evidence of duodenal regurgitation led to the investigation of Boldyreff's theory of the "Self-Regulation of the Acidity of the Contents of the Stomach," and the article deals with the methods employed and the results obtained, illustrated by twelve diagrams. The conclusions arrived at are as follows:

(1) A tryptic enzyme is almost constantly present in the fasting and digesting contents of the normal human stomach.

(2) The tryptic enzyme is deduced to be trypsin regurgitated from the duodenum.

(3) Trypsin in the gastric contents is highly resistant to the action of acid and pepsin.

(4) In general—the tryptic value is high in the presence of low acidity and in alkaline reaction, and of low value when the gastric contents are of high acid concentration. A fall in the acidity is usually accompanied by a rise in the tryptic values.

(5) The color of the gastric contents often changes during the period of experiment from that of the ingested material to a golden yellow or a dark olive or blue green. This color change is due to regurgitation of bile from the duodenum and is absent on a diet of substances which do not cause the outpouring of bile.

(6) The tryptic values in the gastric contents usually rise concomitantly with the color change, although in a non-bile stimulating diet the tryptic value seems independent of the color.

(7) Sodium bicarbonate in 5 per cent. solution is held in the stomach until sufficient HCl is secreted to bring the alkalinity to a point where it is non-irritating to the duodenum. The retention is accompanied by a high trypsin value—suggesting antiperistalsis in the duodenum in response to an irritant.

(8) Sodium bicarbonate in 1 per cent. solution hastens the emptying of the stomach either by increasing the motility of the stomach or opening the pylorus.

(9) Sodium bicarbonate solutions do not inhibit human gastric secretion, but seem to have a direct stimulatory effect in some cases.

(10) Free HCl seems unnecessary for the opening of the pylorus, for the stomach sometimes empties while its contents are still alkaline.

(11) 0.5 per cent. HCl ingestion is followed by a rapid fall in acidity to about 0.2 per cent., due to a regurgitation of alkaline duodenal contents, as is indicated by the rise in tryptic values coincident with the fall of the acidity. The acid is then emptied from the stomach.

(12) Regurgitation of duodenal contents into the stomach is but another of the protective functions of which the body furnishes so many examples and has for its purpose the defense of the small intestines from irritants.

MOFFETT, RUDOLPH DURYEA, and NEUHOF, SELIAN: Congenital Dextro-Cardia with Patent Interventricular Septum. (*Am. Jour. Dis. Child.*, July, 1915.)

The subject was a boy three and one-half years old whose family history is negative. The previous history of the patient is as follows: He was the ninth child born in the ninth month, the birth being normal. He was breast fed until the fourteenth month, and then put on solid food. Had measles and whooping cough during his second year. The mother stated that the child had always been "blue" and "short of breath," but never dyspnœic enough to remain in bed.

The child was brought to the hospital because of a persistent cough which had lasted for several months. This coughing seemed worse during the day or while the child was up and about.

Physical examination showed a well-nourished child of three and one-half years with blue lips, active movements of the alæ nasi and breathing with its mouth open. The eyes and teeth were normal, but there was blueness and congestion of the blood vessels of the conjunctiva. The hands, feet, and lips were distinctly cyanotic, and there was distention of the superficial veins of the chest. Physical examination revealed many loud, moist râles over the entire anterior and posterior surface of the chest. The heart showed, on inspection, a vigorous heaving systolic impulse in the right axillary line and in the epigastrium. On palpation, there was a strong, marked systolic thrill felt over the entire precordium. The apex beat was felt most prominently 6.5 cm. to the right of the midsternal line. Corresponding to the area of palpable thrill there was a loud rough systolic murmur; this murmur could be heard over the entire chest both anteriorly and posteriorly. The pulse was 108 per minute; respirations 28.

The roentgenographic examination made January 6, 1915, revealed the following findings: The left metacarpals when compared with the right were found to be short, thickened and club-shaped, although the bone structure seemed to be normal. Other than these no detectable change in the osseous structures was found. Upon examining the thorax, we found that we were dealing with a case of pure dextro-cardia, with considerable general cardiac enlargement. Investigation of the gastro-intestinal tract with the aid of the barium sulphate meal revealed the stomach in its normal position under the left diaphragm. An injection of a barium clysma into the colon, per rectum, gave us normal observations as to the location and size of the large intestine.

In addition to the physical signs already described, diagnostic data were also furnished by careful fluoroscopic study of the heart and an orthodiascopic tracing of its outline. By fluoroscopy, a distinctly enlarged and vigorously pulsating aorta was visible. Beneath it, the pulsating area usually occupied by the pulmonary artery was not visible, but in its stead there was found a hugely dilated, prominent left auricle. The left ventricular shadow was

also very much enlarged; its area could not be definitely distinguished from the left auricle, though their non-synchronous pulsations could be readily determined. The right auricle and ventricle were considerably enlarged.

The correlation of the physical, roentgenographic and fluoroscopic signs—namely: thrill and murmur over the entire precordium most prominent at the xiphoid, apparent absence of the roentgenographic shadow of the pulmonary artery, combined with a general cardiac enlargement—point toward a patent foramen ovale and interventricular septum as the probable congenital lesions. Orthodiascopic evidence of a patent ductus arteriosis was not found, but if the diagnosis of septal defects and pulmonary stenosis be correct, it is safe to assume that a patent duct was present; otherwise there would be no outlet for the blood necessary for the pulmonary circulation.

W. H. S.

HUBENY, M. J.: Roentgen Examination of the Appendix. (*Illinois Med. Jour.*, Vol. XXIX, No. 2, February 2, 1916, p. 109.)

This paper is an effort to extend among the general profession a knowledge of the value of the roentgen examination in cases of suspected disease of the appendix. The writer believes that the appendix exhibits a peristalsis of its own. He bases this belief on the assertion of Moro, who has cinematographically demonstrated peristalsis in the appendix of a dog. [Such evidence is not convincing to one who is thoroughly familiar with the anatomy of the dog, for it will be recalled that the dog has no appendix proper, but in its stead a very large cecum, proportionately very much larger than the cecum in man. The cecum of the dog is supplied with a definite valve which divides it from the ascending colon. Editor.] The article gives a very satisfactory summary of our present knowledge concerning the roentgenologic aspects of appendical disorders.

THE PROTECTION OF THE X-RAY OPERATOR. (Editorial *Brit. Med. Jour.*, No. 2876, Feb. 12, 1916, p. 248.)

At the February meeting of the Roentgen Society a discussion was opened (to be continued at the March meeting) on the subject of the protection of the *x*-ray operator. Dr. Sidney Russ pointed out that while *x*-ray dangers were becoming less formidable owing to the widening knowledge of them, there was still a good deal of uncertainty because the modern outfit furnished perhaps fifty times more energy than the outfit of ten years ago. It would be a great advantage if effective protection could be obtained without resort to legislation, for of all the methods available for ensuring it legislation is likely to be the least popular and the least convenient. In the course of the discussion, Dr. G. H. Rodman suggested that the General Medical Council be asked to include *x*-rays in the medical curriculum, so that before qualification the student should be as fully acquainted with the dangers of the *x*-ray tube as he was with the dangers of strychnine. Sir James Mackenzie Davidson mentioned that while doing screen work he placed a thick lead barrier round the tube; the observer, standing completely behind this barrier, was enabled to see the screen image reflected in a fine plane glass mirror. Dr. Fred. Bailey, of Brighton, said that it was his practice to have a large screen running on castors, the upper third of it being of lead glass. His tube was enclosed in a large lead glass bulb, and under such conditions as these it did not seem probable that any *x*-rays were directly received by the operator.

There remained the ionization of the air, which was quite possibly a source of danger, and Dr. Reginald Morton confessed that after an afternoon spent in *x*-raying a number of cases, he suffered from a severe sense of fatigue. The ventilation of the room did not appear to make matters much better.

Dr. W. Harwood Nutt said that the effects of atmospheric ionization might be prevented by ventilating the room efficiently, having not one, but two ventilators, so that a constant current of air was passing from entrance to exit. Some *x*-ray workers were returning from the seat of war with very bad ulcers on their arms and hands, and for his own part he did not believe that any man could protect himself adequately unless the tube itself, in distinction from the worker, were shielded. Dr. N. S. Finzi gave an interesting experience which seemed to show the negligible character of stray radiations spread over a period. One of his assistants had placed an enclosed Sa-

bouraud pastille on the front of his apron and another on the back. The pastille in front was found to have turned to the "B" tint after about two weeks' hard work (*x*-raying every morning and eight afternoons) but the pastille on the back of the apron was still unturned after six weeks, and it did not seem likely that a full dose would be received there within a shorter period than three months. Such a dose, even though continued over a long time, could scarcely do the operator very much harm.

Dr. Bailey stated that he had noticed a certain amount of anemia among persons constantly receiving *x*-ray treatment, and Dr. Russ said that one of the hidden dangers of *x*-rays was undoubtedly the blood change brought about. In the cases investigated the red cell content was invariably shown to be below the normal, and in many cases the white cell content also. The lymphocytes were in almost every recorded case very greatly reduced.

As to a cure for *x*-ray dermatitis, Dr. Rodman said that his own trouble, including split nail, had practically cleared up after he had followed the plan of avoiding the *x*-ray tube as much as possible and exposing himself to sunlight and fresh air.

LEDOUX-LEBARD, R.: The X-ray Findings in Pulmonary Actinomycosis. (*Bulletins et Mémoires de la Société médicale des Hôpitaux de Paris,* July 17, 1914.)

There are three groups of cases of pulmonary actinomycosis. In one class, it affects first the thoracic wall and the pleura, later extending down into the lung. In the second class, it extends usually from the cervical region by lymphatic channels into the lung. In the third group, one sees the lesion primarily in the lung, without any other localization, at least during the early stages. Ledoux-Lebard reports three cases.

The first case was a boy of twelve years, whose primary lesion was in the right mammary region. Pleurisy and pulmonary phenomena were first manifested in the right chest three months after the appearance of the primary lesion; in fact, by that time the primary lesion was nearly cured. Roentgen examination showed a zone of uniform cloudiness covering the right lower lobes, and extending upward toward the hilus. The right diaphragm was deformed, nearly immobile, and the right costophrenic angle was obliterated. There were numerous enlarged glands about the hilus, especially marked on the right side. The roentgen findings pointed to an actual increase in the density of the pulmonary tissue rather than to the existence of fluid in an appreciable quantity. The physical findings had not revealed any definite evidence of a pleuropulmonary lesion.

In the second case, the findings were very similar. There was also a certain amount of fluid in the pleural cavity and more marked enlargement of the hilus glands.

The third patient was a physician who showed exclusive pulmonary actinomycosis without any other lesion. The lesion was for a long time unknown, and was thought first to be tuberculosis and then cancer of the lung. Finally the patient developed a large actinomycotic cavity. *X*-ray examination contributed to eliminate a tuberculous or malignant lesion. The findings in this case were those of a pulmonary abscess and signs of sclerosis of pulmonary and bronchial tissue due to the long duration of the affection.

BARCLAY, A. E.: A New Method of Extracting Bullets. (Editorial in *The Lancet,* Vol I, 1916, No. IX, Vol. CXC, No. 4826, Feb. 26, 1916, p. 476.)

Many methods of removing bullets and other metallic projectiles from the tissues have been invented, and some of them have proved in practice extremely ingenious and useful. The latest method has been invented by Captain A. E. Barclay, R.A.M.C. (T.), who demonstrated the use of his instrument recently at a meeting of the Electro-Therapeutic Section of the Royal Society of Medicine. Captain Barclay pointed out that in most methods of localization a very slight alteration through movement was sufficient to neutralize the information obtained from the *x*-rays when the bullet might not be found. He held it to be necessary that when the position of the bullet had been ascertained, it should be kept under observation on the fluorescent screen until it had been removed. In his method the position of the bullet was first determined by

means of a screen, and this position was marked on the skin by means of an aniline pencil. Then the pair of forceps he had devised is taken; it bears a small fluorescent screen so that the surgeon can keep the bullet in sight during the whole time of the extraction. The forceps are so shaped that the handles are at a right angle with the blades, and therefore do not obtrude on the line of vision. One blade is longer than the other and is hollowed so that the other blade can rest in it when the forceps are closed. Each blade is connected with an electric current so that when a metallic body is seized by the blades, a bell rings, but by means of a small piece of insulating substance no electric contact is effected when the blades are closed. A small incision is then made through the skin, through the marked spot of a length of an inch or a little more, and the forceps are passed through the opening and are directed towards the bullet, guided by the view in the small screen. When the longer blade touches the bullet, the blades are separated and the bullet is grasped between the blades, and then the bell rings. The whole instrument, including the screen, is sterilizable. At the demonstration several bullets were extracted very expeditiously from a loaf in which they had been embedded. The method has been employed by Captain Barclay in some dozen cases, and in every case the bullet was removed easily, except in two where the wound was of old standing and the bullet had become surrounded by a mass of fibrous tissue; but he explained that if this instrument were employed early there would be no risk of the formation of this fibrous tissue. These forceps have also been employed for the removal of needles. The method appears to us to be extremely ingenious and practical, and well deserving of an extensive trial. One great merit which it possesses is that a bullet can be removed from a great depth through a very small incision in the skin.

EISEN, E. J.: Dental Roentgenology. (*Dental Items of Interest*, Vol. XXXVIII, No. 2, February, 1916.)

Pathology as shown by the roentgenogram is fast becoming the deciding factor in dental treatment, and our conception regarding the normality or abnormality of teeth must be based upon this aid in addition to clinical observation. Unless a mouth is negative, especially in the bicuspid and molar region, a plate is employed, if for no other reason sometimes than that of routine.

Examination should be impartial, with no preconceived ideas as to conditions that may be present. Abnormalities impossible to surmise are in this way discovered hidden in areas often impossible to cover with a film, and are often overlooked as inconsequential. A plate leaves no doubt in one's mind, and in very many cases one is rewarded for the additional trouble. Each single area, comprising teeth either crowned or negative to the electric current, is covered with a confirmatory film. This film then gives one a picture the opposite aspect of which is shown in the plate, this being due to the fact that the plate is an extra-oral exposure, and the film, intra-oral.

By following this routine we have been rewarded innumerable times by the detection of unerupted teeth, especially third molars, cysts, roots in the antrum, diseased antra, many times an abscessed molar, possibly undetectable in a film because of a different aspect, foreign bodies, in fact, the solution of the problem has often been given in a most dramatic manner. The objection made to plates because they lack detail is due to faulty technique, but further detail may be obtained with a film subsequently applied if the operator knows of or has found a condition which will allow the placing of a film in a position definitely located in the plate.

Taking a film of a suspected area in the mouth without a plate first is comparable to a dilettante roentgenologist making an examination of only one kidney because the patient has the pain on that side.

In reporting roentgenographic findings of apical conditions it is as a rule justifiable only to state in any given case whether the condition shown is normal, probably normal, probably abnormal, or definitely abnormal. We are not warranted on roentgenographic findings alone in hazarding a diagnosis of the actual pathological condition present in the tissues hidden from view. Even with the aid of clinical examination, history and symptoms, it is seldom that we can say definitely what the abnormal shadow represents.

An area of lessened density around the apex

of a tooth root, permitting the rays to penetrate, means that bone alteration has taken place, but the picture does not tell us whether the cavity formed is an abscess containing pus, is filled with chronic inflammatory granulation tissue, or is a cyst.

The apical portion of the root of a tooth surrounded by an area of bone absorption or rarefaction may and usually does give a roentgenographic picture of irregular absorption, of an increase in thickness of the root apex due to secondary deposit of cementum, of a combination of the foregoing, producing an irregular outline of the shadow of the root, or of lessened density of the apical portion of the root, denoting necrosis. On the other hand, there may be thickening or clubbing of the root apices due to deposit of cementum that has kept pace with the bone absorption so that no surrounding area of lessened density is visible.

The ability to interpret a roentgenogram is as much dependent upon a conception of pathology as upon experience and study.

BYTHELL, W. J. S.: Radiography of the Chest in Children. (*Archives of Radiology and Electrotherapy*, No. 188, March, 1916.)

Foreign bodies in the esophagus and respiratory tract are more frequently met with in young children than in adults, and they include a very large variety of objects, such as pins, buttons, coins, metallic toys, etc., which children are fond of putting in their mouths. Most of these are easily discovered upon the screen, but ordinary pins are not readily detected, even with a good apparatus. If the screen examination gives a negative result, a series of plates of the chest may be taken when it is important to obtain a definite diagnosis. In the majority of cases the foreign body will be found impacted at the level of the costoclavicular joints, especially if it be a coin, or at the cardiac orifice.

Its localization is usually not difficult, but if there is any doubt as to whether the object is in the esophagus or the trachea, a spoonful of bismuth paste will serve to indicate the position of the former. The same procedure should also be adopted when examining for objects which are quite transparent to the rays, when partial or complete stoppage of the bismuth will reveal the presence and position of the foreign body in the esophagus.

Foreign bodies in the bronchi will usually be found lodged close to the root of the lung, but we have seen a small round pebble at a distance of over two inches from the hilus in a child of four.

Little need be said in reference to the *x*-ray examination of the esophagus in children: in all technical details it resembles that of adults.

The fluorescent screen plays a very important part in the diagnosis of pulmonary lesions in children. The examination of the chest in children should always commence with a thorough inspection of the thorax with the aid of the screen, roentgenograms being taken subsequently whenever necessary, to confirm any doubtful points, or to obtain a permanent record.

The screen examination is particularly easy in young children on account of the translucency of the parts. The shadows are also seen very much more sharply than in adults owing to the proximity of the lung structures to the surface of the screen. With a good *x*-ray apparatus and a certain amount of practice, it should be easy to see even the faintest pathological mottling in the lungs, and to readily distinguish it from the normal shadows. In fact, it is no exaggeration to say that an experienced observer should be able to see upon the screen practically everything in the thorax of a child up to the age of ten or twelve years that can be rendered visible in a roentgenogram. The finer details, as we have said, can only be seen distinctly by localizing the beam of rays so as to illuminate a small area at a time. The Coolidge tube is particularly well suited for this purpose.

The points to which attention must be directed during the screen examination are (1) the movements of the diaphragm and ribs, (2) the lighting up of the lungs during inspiration, and (3) the presence of abnormal shadows.

In a child who has not been subjected to a tuberculous infection of the roots of the lungs there is visible nothing but the fine radiating bronchial shadows already described, unless the bronchi have become thickened as the result of chronic bronchitis, in which case these structures may be unduly prominent upon the screen or plate. In the majority of "healthy" children, however, evidence is to be found of

old glandular infection in the form of one or more well-defined and opaque nodules at the roots, and in many instances these will produce shadows as dense as those caused by leaden shot. In others the foci may be seen scattered about the lungs, denoting the presence of healed areas of tuberculous bronchopneumonia.

The distinguishing features, in fact, between old and recent foci are the opacity and sharp definition of the former as contrasted with the softer and less opaque mottling caused by active disease. When there is room for doubt as to the activity of the lesion, the question must be settled upon clinical grounds, and the case kept under periodical observation to note progress of the disease. It may be urged, indeed, that in no other branch of radiography is it so necessary to combine together the *x*-ray and clinical evidence as in the diagnosis of early hilus tuberculosis in young children. For instance, in many cases the *x*-ray examination will reveal faint mottling at the root of one or both lungs, but these shadows may be so slight that a definite diagnosis of tuberculosis may not be justified, or it may be impossible to decide whether the infection is active or quiescent. In such cases, a clinical history of cough, irregular pyrexia, night sweats, and so on, would fully establish a positive diagnosis of active pulmonary tuberculosis in an incipient stage. In this connection it is also very important to bear in mind that definite *x*-ray evidence of hilus disease may be forthcoming when there is entire absence of physical signs, or, at most, some suspicion of diminished resonance over the roots posteriorly, combined perhaps with a suggestive history of general ill-health. In such cases the great value of an early diagnosis by means of the *x*-ray is obvious.

In our experience the earliest signs of hilus infection are more frequently met with at the right root than at the left. In 200 consecutive cases of early disease that we have examined, the right root was affected in 37.5 per cent., the left in 20.5 per cent., while in the remaining 42 per cent. there was early disease at both roots.

In advanced cases the presence of extensive shadows will denote the spread of the disease into one or more lobes. A definite line of extension towards the apices may be visible, but it is only in comparatively exceptional cases that there is much apical consolidation in young children, and then only when there are very advanced lesions in other parts of the same lung.

NORTHRUP, W. P.: Disseminated Miliary Tuberculosis. (*Archives of Pediatrics*, Vol. XXXII, No. 12, Dec., 1915, p. 887.)

Few of these cases have been reported. The present case is but an echo of the previously published cases which were merely of interest as to diagnosis. It was difficult to interpret confidently the physical signs of chest lesions and the *x*-ray helped to a diagnosis: the skin lesion was rare and obscure. In the present case the percussion findings were unchanged, there was no bronchial voice or breathing, no râles in front. At the angle of the scapula there were increased voice sounds and whistling râles. In a feeble marantic infant these would not be conclusive signs. Here is the triumph of the *x*-ray method. The child was pot-bellied, liver and spleen somewhat enlarged, otherwise there is little to record.

Among the negative tests may be mentioned that no tubercle bacilli were found in the sputum or in the feces (one doubtful is mentioned), and what is more of interest none was found in the skin eruption. They were abundant in former cases.

DEPARTMENT OF BOOK REVIEWS

EDITOR, EDWARD H. SKINNER, M.D., KANSAS CITY, MO.

FRACTURES AND DISLOCATIONS, DIAGNOSIS AND TREATMENT. By Miller E. Preston, A.B., M.D., First Lieut. M.R.C., U.S.A.; Surgical Examiner, Colorado State Board of Medical Examiners; formerly Police Surgeon, City and County of Denver; Instructor in Anatomy, University of Denver, and Visiting Gynecologist to City and County Hospital, Denver, Colorado. With Chapter on Roentgenology by G. H. Stover, M.D., Professor of Roentgenology, School of Medicine, University of Colorado; Member of American Roentgen Ray Society; Visiting Roentgenologist to City and County Hospital, St. Joseph's Hospital and Children's Hospital, Denver, Colorado. 860 Illustrations. C. V. Mosby Company, St. Louis, 1915. Price, $6.50.

TREATISE ON FRACTURES. By John B. Roberts, A.M., M.D., F.A.C.S., Professor of Surgery in Philadelphia Polyclinic and College of Graduates in Medicine; sometime Chairman of Fracture Committee of American Surgical Association; Membre de la Société Internationale de Chirurgie; and James A. Kelly, A.M., M.D., Attending Surgeon to St. Joseph's, St. Mary's and St. Timothy's Hospitals; Associate in Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine. With 909 Illustrations: Radiograms, Drawings and Photographs. J. B. Lippincott Company, Philadelphia and London, 1916. Price, $6.00.

DISLOCATIONS AND JOINT FRACTURES. By Frederic J. Cotton, A.M., M.D., First Assistant Surgeon to the Boston City Hospital; Assistant Professor of Clinical Surgery in Tufts College Medical School, Boston. With 1201 Illustrations, 830 from Drawings by the Author. W. B. Saunders Company, Philadelphia and London, 1910. Price, $6.00.

THE TREATMENT OF FRACTURES: with Notes Upon a Few Common Dislocations. By Charles L. Scudder, M.D., Surgeon to the Massachusetts General Hospital; Associate in Surgery at the Harvard Medical School. Eighth Edition, Revised and Enlarged. Octavo volume of 734 pages, with 1057 original illustrations. Philadelphia and London: W. B. Saunders Company, 1915. Polished Buckram, $6.00 net; Half Morocco, $7.50 net.

BONE-GRAFT SURGERY. By Fred H. Albee, M.D., F.A.C.S., Professor of Orthopedic Surgery at the New York Post-Graduate Medical School and the University of Vermont. Octavo volume of 417 pages, with 332 illustrations, 3 of them in colors. Philadelphia and London: W. B. Saunders Company, 1915. Cloth, $6.00 net; Half Morocco, $7.50 net.

Nearly every roentgenologist at frequent intervals becomes the interested adviser of his surgical clients who now almost universally demand roentgen records in every fracture or dislocation. The discussions in a roentgen laboratory upon the proper procedure in a given case calls forth the authorities from the shelves of the laboratory library.

There are now many good books upon these subjects, but as usual one does not find in any one book the whole subject sufficiently outlined. It is gratifying to note that the more recent books carry an unusual number of roentgen illustrations. The books by Preston and Roberts & Kelly are profusely decorated with roentgen plates. The newer editions of the older standard textbooks indicate that the authors have witnessed the growth of the roentgen specialty and therefore have injected sufficient *x*-ray illustrations to give their textbooks another lease of medical life.

The book by Preston carries out the unexpressed belief of every experienced roentgenologist that he can sketch the outlines of a majority of fracture cases which come to the laboratory before the negative is made. After considerable experience in noting the attitude, pain and external appearance of fractured limbs and correlating these clinical findings with the finished *x*-ray plate the roentgenologist develops a sixth sense or fourth dimension in fracture diagnosis. Preston has succeeded

in conveying this clinical appearance of fresh fracture cases to his readers by profuse illustrations of the limbs before any manipulation or dressings have been applied. The addition of the *x*-ray plates serves to convey fracture diagnosis to the physician in an unusually convincing way. For instance, upon page 233 Preston shows the photograph of a forearm with a fractured ulna and then, beneath, the roentgenograms in two planes. This feature is scattered profusely throughout the book, making it of special benefit to the clinician. Probably this method was encouraged by our late member, Dr. George H. Stover, who has contributed a most practical chapter upon roentgenology. This chapter by Stover is written in his characteristic style and it would seem as though we were listening to one of his lively discussions at an annual meeting. He drives home the necessity of raying every fracture, insisting that the universal distribution of apparatus no longer furnishes an excuse to the careless surgeon. It would be well for every interpreter of roentgen negatives to commit to memory the last page (753) of Stover's chapter where he calls attention to an array of misinterpretations.

The latest book upon fractures by Roberts & Kelly gives one the impression that this is a roentgen atlas. There are 909 half-tone cuts and probably 90 per cent. are roentgenograms. These are all excellent plates and not any have required sketches to bring out the essential points. We would also call attention to the elaborate statistical tables upon the frequency of various fractures confirmed by roentgenograms, which were gathered from the clinics of Bruns, Chudowsky, Immelmann and Plagemann. Another pleasing chapter is upon Fractures of the Vertebræ, which is replete with information of great value to the surgeon; a chapter so often couched in hopeless prehistoric language. We would say that this chapter is a brilliant gem in the middle of a book full of good material worthy of a reviewer's mention. We would direct the attention of every railroad surgeon and his medico-legal confreres to this chapter upon Vertebral Fractures. There are several unusual chapters in this book by Roberts & Kelly, to wit: Fractures of Sesamoid Bones, Birth Fractures, Fractures of the Sternum and a remarkably clear exposition of the operative Treatment of Closed Fractures. There is little doubt but that this textbook is the latest 1916 model for general consumption.

When it comes to ample descriptions of joint fractures there is probably no book which compares with Cotton's. Especially would we direct attention to the pages upon Fractures and Dislocations of the Carpal and Tarsal Bones. We doubt whether this book has achieved the wide distribution it deserves because its title (Joint Fractures and Dislocations) might seem to limit its value. This book by Cotton is essentially a one-man, one-subject, one-illustrator book. Every time Cotton wants to make a point he draws a sketch to pound the point home. Rarely does a medical author possess this additional illustrative talent. The reviewer has found this volume by Cotton of invaluable service to his surgical clientele, when discussions upon the proper surgical venture in certain joint fractures are provoked while reviewing the roentgen negatives.

The present furor in bone surgery which received its impetus from Sir Arbuthnot Lane, who put the kink in surgery and the steel in splints, has stimulated an array of original methods which, to the superficial observer, would indicate many parallelisms. But the autogenous bone-graft of Albee is an original method of introducing cabinet-making into surgery. Albee's book brings out the fact very clearly that the technique is the essential element of success. You cannot yank bone tissue about as you can abdominal organs. You cannot displace bony anatomical relations as you see many surgeons festoon an intestine into grotesque relations. It is as essential to have the proper instruments and operative equipment for successful bone-grafts as it is necessary to have Coolidge tubes for deep roentgen therapy. Albee has delved into all sorts of mechanical methods to mend breaks in wood and metal and has adapted these to the breaks in human bones. To the nonsurgical observer Albee's methods seem logical and Albee's arguments appear logical, notwithstanding the attack of surgical contemporaries.

What the qualified surgeon may conclude to do with his fracture case is not the essential point of this review—it is rather to point out to roentgenologists that there are certain reliable textbooks which should be upon the ref-

erence shelves of the laboratory for the guidance and instruction of surgical patrons. To complete the Fracture Book Shelf we would add the classical Scudder and the venerable Stimson in their latest editions. Scudder is always to the point, brief and convincing in style.

THE MEDICAL CLINICS OF CHICAGO. March, 1916, Vol. I, No. 5. Published Bimonthly by W. B. Saunders Company, Philadelphia, March, 1916.

This book contains much of interest to the roentgenologist; the first 50 pages are given over to a lantern slide clinic at St. Luke's Hospital by Dr. James T. Case upon the Roentgenologic Aspects of Intestinal Stasis. Dr. Case has not only reiterated much of his former writings upon this subject but has also incorporated the experimental work of Keith and others. It is certainly a most readable article and worth the attention of those who have no crystallized ideas upon Intestinal Stasis. Case persists in his advocacy of ileocolic valve incompetency as an essential factor in intestinal and ileal stasis. Along with many other roentgenologists Case has forged away from the idea that the position of the colon has very much to do with its function, and that mechanical obstruction at the hepatic or splenic flexure is not common, contrary to a generally accepted surgical idea that many cases of constipation are due to kinks or atony of the bowel muscle. Case claims that in the majority of such cases the bowel is hypertonic and "stasis perhaps originally occurs in the pelvic colon, and being allowed through neglect to persist there, gives rise to colitis, pericolonic sub-infections with adhesions and spasticity, and that these three factors may be considered as the active mechanical causes of constipation as the result of which the point of origin of antiperistaltic waves moves distalward, and the sum total of the antiperistaltic influence is increased. The right half of the bowel becomes affected with stasis, chronic appendiceal and ileo-caecal valve changes supervene, and finally the stasis extends to the terminal ileum where the results are much more quickly felt by the organism."

Several other cases of *x*-ray interest are reported, although it does not seem that the full value of the roentgen examination in these cases was appreciated. For instance, there is a ten-page discussion of a case of carcinoma of the stomach, in which the *x*-ray examination of the stomach would have seemed to clinch the diagnosis. The old ambition for complete and conclusive laboratory findings seemed to have clouded the true value of the roentgen examination. We might also find fault with the interpretation of the *x*-ray negative of the hand in the case of bronchiectasis with cardiac decompensation upon page 81. The footnote states that the *x*-ray negative of this hand showing marked clubbing of the fingers also showed the overgrowth of the spongy bone at the finger tips. There is hardly sufficient change in the terminal phalanges in this case to warrant an interpretation of pathological significance.

GUNSHOT ROENTGENOGRAMS. A Collection of Roentgenograms Taken in Constantinople During the Turko-Balkan War, 1912-13, Illustrating Some Gunshot Wounds in the Turkish Army. By Clyde S. Ford, Major, Medical Corps, U.S.A. *War Department Bulletin*, No. 9, October, 1915, Government Printing Office, Washington, D. C.

This collection of 162 roentgenograms was collected by Major Clyde S. Ford during a systematic visiting of the Constantinople hospitals in the winter of 1912-13 during the course of the first Balkan War with the idea of securing samples of roentgenography in gunshot wounds that might show characteristic lesions without relation to detailed clinical records. Major Ford's collection was made after an examination of more than 1500 plates.

All of the roentgen reproductions have attached descriptions of the projectile, the probable range, projectory, the velocity and the energy, with incidental notes concerning the prognosis, convalescence and result. The quality of the roentgenograms does not begin to compare with those which we have seen from base hospitals during the present European War, but this lack of quality does not seem to interfere with an acute interpretation on the part of the author. While the price of this monograph is not indicated, we believe that all of the War Department Bulletins are extremely cheap.